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A complete minor surgery : the practice



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A COMPLETE
MINOR SURGERY,
THE
PRACTITIONER'S VADE MECUM,
INCLUDING A TREATISE ON
VENEREAL DISEASES.

BY

E. C. FRANKLIN, M. D.,

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Institute of Homeopathy, Author of "Science and Art of Surgery,"
"Treatise on Spinal Curvature," etc.

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TO
My Esteemed Friend,
And Earnest Advocate of the Cause of Homœopathy,

JOHN N. ECKEL, M. D.,

OF

SAN FRANCISCO, CALIFORNIA,

who for many years has given me his full confidence and material support in the work of medical education, and whose interest and friendship in my behalf have filled me with pleasant memories, this work is cordially dedicated, as a slight acknowledgment of his exalted worth and many excellences of character, by his friend

THE AUTHOR.

PREFACE.

As a teacher of Surgery, and the various processes and methods of treatment connected with it, I have been repeatedly requested by students of Homœopathic colleges to prepare a treatise on Minor Surgery.

An early effort in this direction was presented in my "Science and Art of Surgery," which, though confessedly imperfect, may be justly claimed as the pioneer work in this department of our literature.

Since then the range of Minor Surgery has been continually extending, including much that pertains to accessory treatment and the general management of the sick-room, till now it forms in itself a distinct and systematic branch of study.

The authors of our large works on Surgery have assumed much of this preliminary knowledge; and, as a consequence, many important and interesting details have been omitted, or else too briefly mentioned to satisfy the requirements of the profession.

The present volume, therefore, is written with the intention of occupying this ground, and of furnishing the student and the busy practitioner with the teachings of Homœopathy upon the different subjects considered, in as complete and concise a form as possible.

With my best wishes for the success and prosperity of hundreds of my brother practitioners, with whom I have labored in the past for the honor and perpetuity of our glorious cause, and a heartfelt New Year's greeting to those of my students who have gone forth like good husbandmen to labor in the broad and ever-widening field of medical knowledge, whose reputations and good names will always be endeared to me by associations in the past,

I remain, very gratefully,

your friend,

E. C. FRANKLIN.

UNIVERSITY OF MICHIGAN,

January 1, 1882.

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MINOR SURGERY.

PART I.

General Surgical Semeiology.

CHAPTER I.

IN order to arrive at a proper understanding of the work before us, and for the advantages of systematic study, I shall present, under the titles of General Surgical Semeiology and Therapeutics, those considerations that pertain to the investigation of the character and results of certain surgical disorders, and also the remedies that enter into their treatment. The results, or pathological lesions that are intimately associated with such disorders, will be considered under the head of Surgical Pathology; while the characteristics of the disease, as well as the adaptability of means for its cure, will be treated under the head of Surgical Therapeutics.

Modifications of Healthy Nutrition.—Surgical Pathology, a branch of General Pathology, teaches the investigation of those derangements or abnormal conditions that pertain more exclusively to the practice of the surgeon than the physician. All diseases, considered as deviations from a healthy standard, "may be studied either as exhibited in the disordered action noted in special tissues, or in that seen under very much the same general characteristics wherever developed: hence they are divided, for

systematic reference, into special and general disorders." The proper understanding of the great principles that enter into the consideration of general derangements will facilitate the student in the appreciation of those modifications and differential changes that are met with in diseased action in special localities. Health being considered as a normal condition of each component part of the organism, which is "maintained and developed by a series of acts designated as Nutrition," a brief reference to the views of physiologists on this process will tend to the elucidation of points in disease, or that condition resulting in, or from, a modified nutritive action.

Outlines of the Normal Nutritive Process.—Nutrition is defined by physiologists "as that modification of the formative process peculiar to living bodies, by which the tissues and organs already formed maintain their integrity." All tissues and organs in the body are shown, by microscopic investigation, to consist in a series of minute elementary atoms called cells, the vital functions of which, or, as it is termed, cell-action, afford nutrition to every part of the organism. To accomplish, therefore, the process of nutrition, three phenomena are required: first, a normal cell-action; second, a proper condition and supply of blood; third, a proper nervous or life force to regulate all. Any deviation from this state is productive of diminished or excessive reaction.

The demand for nutrition arises primarily from the tendency of the organism to simply increase or grow. The multiplication of the first embryonic cell is illustrative of this process, by what is termed "duplicative subdivision," by which a multitude of cells are formed, each one being in all essential particulars similar to the original. It is by this process that the embryo becomes the child, the child the adult, with comparatively little change save that of growth. The changes are divided by physiologists into four well-marked ages, or periods: 1st, *Development*; 2d, *Growth*; 3d, *Adult Life*; 4th, *Old Age*.

Development begins primarily in intra-uterine existence, and is the increase or passage of the germ to a higher condition of form and structure. In this change which takes place, the part becomes fitted for some special function, and is advanced toward the state in which it exists in the highest or most complete form of its specific type.

Growth consists in the advancement of size, and is most marked between the period of birth and puberty. The difference between the processes of development and growth, is most marked in those cases in which there is a partial or complete arrest of one without a corresponding impairment of the other. Thus, a dwarf, however small in stature, may present a perfect development of every part that is characteristic of the complete human organism, the deficiency being solely in the capacity of growth. On the other hand, the ordinary size at birth may be attained, every organ presenting its usual dimensions, and yet some important part may be found in a state of arrested development. This is apparent in those abnormal conditions of the heart and brain that are sometimes witnessed in extra-uterine life. An excess of growth, taking place conformably to the normal place of the tissue or organ, constitutes hypertrophy; a diminution of growth, without degeneration or alteration of structure, is known as atrophy.

Adult Life is essentially the period in which nutrition plays the most important part. During the time of active life, a demand for nutrition is created by every exertion of the vital powers, but more especially by the evolution of the nervous and muscular forces. The production and application of these two forces may truly be considered the great end and aim of the human organism, so far as the individual is concerned. At this period the forces of the organism are diligent in preserving the development already attained, and repairing the waste continually going on. This is effected through the process of assimilation, manifested from the beginning of existence up to the period of death of the organism.

Old Age is the period characterized by impairment of nutrition, with a progressive tendency to wasting and decay. Evolution takes the place of involution. In advanced age, from insufficient nervo-muscular energy, nutrition is performed less rapidly, and waste is the result. Thus, then, with the advance of old age, the organism becomes progressively more and more unfit for the active performance of its vital operations; a gradual weakening is observable in the mental as well as in the corporeal energy. Degenerations of the tissues and organs of the body proceed as age advances; and the entire system, unable to perform its accustomed functions, gradually sinks into death,—the end of life.

The performance of the function of nutrition is dependent not merely upon a due supply of pure and well-elaborated blood, but also upon the normal condition of the part to be nourished, and especially upon its possession of a right measure of "formative capacity," in virtue of which the newly produced tissues are generated in the likeness, as well as in the plan, of those which have become effete. The exactness of the replacement is most remarkably shown in the retention of the characteristic form and structure of each separate organ or part of the body, and thus of the entire organism, through a long series of years; no changes being apparent (so long as the state of health is preserved) but such as are conformable to the general type of that alteration which the organism undergoes with the advance of life. This is observed not only in the conservation of the peculiarities that make the species, but is also seen in the continuous renewal of those minor characteristics which serve to distinguish man from his fellows. Not only is this formative power exercised in maintaining the original type, but also in keeping up certain acquired peculiarities; as, for instance, the cicatrix left after the healing of a wound. In the preservation of life, whether of a tissue or the whole organism, nutrition consists in the performance of two distinct offices: ~~in one~~, material is furnished for the formation of new cells, whose ~~function~~ is to replace those whose existence has terminated; in ~~the other~~, the waste constantly going on is supplied in those textures ~~in which the organic forms are permanent~~. This process is ~~carried on~~ by the function of assimilation and digestion, the new ~~material being~~ furnished to the blood, and by it supplied to every ~~tissue and organ~~. Thus, nutrition consists in a process essentially ~~formative~~ on the one hand, and destructive on the other. When these processes are evenly balanced, health is maintained, ~~the normal condition of the~~ organism preserved. During the ~~period of growth the formative~~ process is in the excess, and ~~development~~ is produced. In old age the reverse takes place, and ~~premature decay ensues~~. When the disproportion between the ~~formative and destructive~~ processes results in abnormal growth, ~~it is said to occur~~: when a similar excess of the ~~destructive~~ processes takes place, atrophy ~~will be further considered in a subsequent chapter~~ under their respective heads; to which the

CHAPTER II.

Surgical Semeiology.

THE correct investigation of the elements of a disorder being essential to a recognition of its presence, the first subject to which attention should be directed is Surgical Semeiology, or that portion of pathology which teaches the signs, or symptoms, of surgical disorders. Of these signs, some are equally applicable to many complaints, and may be studied together, being rather generic in their character; while others, which are more specific, can be best alluded to under the particular head to which they belong. Presupposing that the practitioner is fully acquainted with the anatomy and physiology of the human organism, I shall consider, first, those signs and manifestations of surgical disorders which are exhibited for the most part on the exterior portion of the body; second, those symptoms that more strictly belong to derangement of the internal organs.

SECTION I.

Signs Manifested on the Exterior of the Body.

Health being considered as the result of the perfect operation of all the normal organs of the body, any deviation from this condition constitutes disease. This abnormal state of the parts will be known by the changes that develop in the individual, and which are cognizable to the senses of the surgeon. The province of the surgeon, therefore, is to make himself familiar with the general external condition of the body, as is manifested in the carriage, posture, shape, color, temperature, and sensibility of the individual, that he may be the better enabled to discriminate between a healthy and diseased condition.

Of the Carriage or Posture of a Patient.—The carriage of a man in the full enjoyment of his physical and mental powers, is erect, lithe, and graceful; but, when these powers are invaded by disease or accidental injury, they become prostrate, and the individual seeks repose in the recumbent, supine, or sitting posture.

The character of the injury will often become manifest by the position occupied by the sufferer.

The supine position, in which all the limbs are relaxed, generally indicates, if the result of external violence, great muscular debility, or debility or serious depression of the nervous system; all parts of the body being dependent on this great center for life-force. The doubling of the body *forward*, or that position in which the limbs are drawn up toward the chest, usually shows abnormal trouble; while its rigidity backward, or extreme extension, the head and heels approximating each other, shows a derangement in the contents of the spinal canal. The *sitting posture* may be either the result of partial external injury, by which the individual is prevented from assuming the erect position, or it may follow an effort to leave the recumbent attitude, the strength not being sufficient to stand upright.

The relaxed condition of the extremities, or their *fixedness in unnatural positions*, is often diagnostic of injuries by which muscular action is more or less impaired. The power of moving a limb or any portion of the body, freely and at will, denotes health; but a trembling, unsteady, quivering motion, imperfect elevation, or unnatural flexion or extension, denotes an impairment of the muscular powers or nerve-force. In health the mechanical movements of the body and limbs are easy and graceful, while in the injured or disordered condition it is quite the reverse. In the examination of a patient, therefore, the surgeon should compel him to go through a regular set of motions, that he may be able to diagnose with accuracy the parts disordered. In conducting an examination of this character, the body should be divested of all extraneous covering, and the manipulation be made with special reference to the part diseased or injured. In the examination of recruits for the army, the surgeon directs the individual to be entirely divested of clothing, and to stand erect before him. Inspection is then made of his general carriage, the position of the head upon his shoulders, the fullness of his chest and abdomen, the position of his legs and feet, as well as the general characteristics of his whole external organism. After this a more minute inspection will be made of separate organs and particular parts. The various movements of the arms upon the body, as well as flexion of the spine backward and sideward, the extension and flexion of the hands and feet, and,

finally, of the fingers and toes, are necessary often to detect disease or injuries from accident.

Physiognomy.—The inspection of the countenance, or physiognomy, so often relied upon in determining the moral attributes of an individual, is also depended upon, more or less, in forming an estimate of physical disorder. Thus, a lively countenance betokens not only physical but mental quietude and comfort; while a distorted or distressed expression evinces a condition the reverse of health. The sharp nose, hollow, sunken eyes, knitted brows, tenseness of skin, with the leaden or livid hue of the face, denotes great prostration of the nervous forces, and is indicative of extreme suffocation or the approach of death. A pinched character of the features is often the accompaniment of peritonitis. Spasms of the lips and cheeks, termed "*risus sardonicus*" frequently precede or accompany tetanus. *Frowning* is often indicative of pain in the head or eyes; distention of the nostrils, of pain in the chest, or impeded respiration; contractions of the angles of the mouth, with compression of the lips, are often the result of vesical or rectal irritation; and involuntary spasms of the mouth or tongue denote injury of the nerves supplying those parts.

The Shape and Size of a Part.—In cases of injury, especially of the extremities, the *shape and volume* of the part are points worthy the consideration of the surgeon. These signs demand a comparison of the different sides of the body, it being primarily understood that the right side is more perfectly developed than the left, in consequence of the greater amount of exercise it undergoes. The *enlargement* of any region may develop the formation of unnatural growths in the deep-seated tissues; or the formation of air, as in emphysema of gangrene, or of wounds about the chest; or the existence of matter, or of unnatural secretions, as seen in elephantiasis, in tumors, suppurations, synovial degenerations, etc. The *diminished* size of a region often indicates atrophy, loss of muscular power, or an unnatural relation of parts, as are sometimes witnessed in injuries of muscles, luxations of joints, depressed fracture of the ribs and skull.

Variation in length indicates changes in the natural relations of the continuity or articulating surfaces of bones, and is of importance in determining fractures or dislocations, especially of the extremities. In determining this change in the length of a limb,

two fixed points are to be taken, and the measurement made between these. In the upper extremities, these points, or landmarks, are the acromion process of the scapula and the condyle of the humerus; in the lower extremities, the anterior superior spinous process of the ilium above, and the internal malleolus of the tibia below. Care should be taken in the measurement of the lower extremities; the pelvis should be placed in a direct line with the spine, neither swayed to one side or the other. An obliquity of the pelvis to either side will increase the length of that side to which it leans. The *shape* of parts is frequently of importance in determining the existence of disease. The pyriform shape of hydrocele; the oval, globular, or ovoidal appearance of hernial protrusion; the change produced in joints by effusion or suppuration; the knotted, lobulated shape of canceroid degenerations; the swelling of the abdomen in ascites; the puffiness and œdema of the lids in ophthalmia, etc., etc., are valuable aids to the surgeon in diagnosing the existence of these affections.

Color of Skin.—The *color* of the skin on the different parts of the body is indicative of disease. The results of accident, such as bruises, contusions, etc., are known by a lividity of the integument; superficial burns by redness, and the chocolate tint that accompanies circumscribed or diffused sphacelus. The color of the face is often diagnostic of disorder of the system. Thus, a purple or livid tint of the cheeks denotes derangement in the organs of respiration; pallor of countenance, excessive loss of blood; and a yellow, jaundiced appearance sometimes accompanies gunshot wounds of large joints. Pallor also attends concussion of the brain, and depressed fracture of the skull. In forming a diagnosis of sphacelus from color alone, judgment should be exercised to distinguish it from the effusion of blood beneath the skin from a bruise, or the discoloration of the integument from purpura hæmorrhagica. The color of the skin is also of service in diagnosing tumors, as the nævus maternus, aneurisms by anastomoses, and aneurismal tumors. Whenever an obstruction exists in the circulation of a part through the vessels, changes in the color of the skin lying over them are almost sure to take place.

Temperature.—The *temperature* of the whole body, or of a part, is often of value to the surgeon, not so much as a symptom of disease as indicating a change in the local or general circulation.

Thus, the burning heat of inflammation is often experienced by patients and felt by surgeons as apparently many degrees above the natural warmth of the body; when in reality, according to the observations of physiologists, it is little, if any, exalted above that of the blood.

Cold, or the absence of heat, is of more value to the surgeon as symptomatic of disordered circulation or prostration of the vital forces, indicating the presence of danger from diminished vitality. It is of great importance, after ligation of the larger vessels, to preserve by artificial means the temperature of a part; and also after severe operations or injuries, in order to prevent more serious consequences.

The Excretions and Secretions.—In arriving at a correct diagnosis in certain diseases, it is important that the surgeon should inspect the secretions and excretions of the body, as valuable aids in determining the character of the disorder.

Thus, the *urine*,—whether clear, turbid, or high-colored, or mixed with blood or pus, with or without sediment,—according to its characteristics, points to disease of the kidney or bladder. The *fæces*, too, will oftentimes guide us to a more perfect understanding of a disorder by attention to their peculiarities. Blood, mixed with faecal matter, may be the result of hæmorrhoids, and the same intermingled with pus may denote ulceration; and a contracted, narrow-shaped piece of fæces, as if compressed on its sides by an obstacle in passing, may prove the existence of an enlarged prostate, the development of scirrhus, or the presence of rectal stricture. The *sputa* and *matter vomited*, according to their color, frequently become important guides in determining disorders of the stomach, throat, or lungs. If a wound of the chest is followed by a free expectoration of frothy and bloody mucus, the lung will probably be found to have been injured; while the spitting of blood or pus, and the vomiting of the contents of the stomach, indicate the state of those organs in many surgical disorders.

A continuance of the normal secretions of the body is indicative of the integrity of those organs, in the event of injuries occurring in their immediate vicinity. Thus, a pure mucous expectoration, or the regurgitation of food or drink, after injury of the chest or abdomen, or the natural discharge of bile or of urine after injury of the liver or bladder, is of itself sufficient

to establish the fact that these organs have not participated in the injury. The character of the discharge from wounds, ulcers, fistulæ, etc., is of importance as denoting the pathological condition of the tissues involved. Healthy pus, and the clean, moist edges of an ulcer, show a healthy condition of the part; while dark, sanious, grumous, or offensive matter, with angry-looking edges, denotes the existence of less favorable circumstances.

The characteristics of *pus*, and the differential diagnosis of its various attributes, will be discussed under the chapter on the consequences of inflammation; to which the reader is referred.

SECTION II.

Examination of the Internal Organs.

After investigating the general features of *external* signs of surgical affections, as important in determining the nature of those disorders that fall under the care of the surgeon, it is equally necessary to investigate the state of the *internal* organs, in order to attain the formation of a correct diagnosis.

The four principal portions of the human economy to which I shall call your attention are: *Circulation, Respiration, Digestion, and Nervous Power.*

The Circulation.—The information furnished by a careful inquiry into the state of the circulation in its reference to disease is too well known to require discussion. In hemorrhages, the signs from the state of the general and local circulation are all important. The sudden sinking of the pulse, feeble action of the heart, loss of color in the capillaries, are indicative of loss of the vital fluid. Hemorrhage from the ears, if a young person, is indicative of either rupture of the membrana tympani, or fracture of the base of the skull, involving the petrous portion of the temporal bone. Hemorrhage from the rectum, in case of severe injury affecting the abdomen, is diagnostic of rupture of some of the vessels within that cavity. In tumors associated with aneurismal enlargement, the activity of the local circulation is strongly indicative of the disease. A fibrous, fatty, or other tumor, when bound down by fasciæ upon the course of a large vessel, may prove a source of error, unless close attention is paid to the collateral circumstances. When it is desirable to ascertain whether a pulsating tumor is aneurismal or not, it should be

raised from the subjacent parts, and then observed whether the pulsation continues. This practice is especially referable to enlarged glands or tumors in the axilla, groin, or neck. The absence of the peculiar aneurismal thrill, the solidity of the tumor, its gradual development, the enlargement of neighboring glands, the constitution of the patient, the exciting cause, etc., will become important aids in establishing a correct diagnosis. The state of the circulation, as exhibited in the capillary vessels, is of value in determining the character of tumors, such as the fungoid and the erectile. Thus, rupture of the skin, followed by repeated hemorrhages, will enable us to distinguish between fungus hæmatodes and cancer; frequent bleedings from mucous cavities, accompanied with swellings or tumors, would lead to the suspicion of polypi or ulceration. A suddenly formed tumor in the region of a joint, producing faintness, with discoloration of the skin, and developed after severe muscular exertion, may be diagnostic of either rupture of an artery or subluxation of a joint.

The feeble pulsation of the arteries in the extremities is often associated with either the existence of obstruction in the vessel, or of its ossification. If to this condition be added a change of temperature and color in the part, in an aged subject, it points to the existence of senile gangrene. In examining for the pulsation of an artery at its usual seat, we should always bear in mind the natural malformations that sometimes occur in its course, and not be misled by its non-appearance at its accustomed point, in forming a diagnosis in cases involving disease of those vessels.

The Respiration.—The rapid or embarrassed state of the respiration is often an important aid to the surgeon in forming a correct diagnosis. Thus, slow, snoring, or stertorous breathing may denote mischief done to the brain. A change in the tone of the voice, or the characteristic cough, may lead us to suspect the existence of disease in the larynx or trachea, as well as foreign bodies impacted in the trachea or œsophagus. A hacking cough, with efforts to clear the throat, accompanied with titillation in the part, is evidence of disease in that part. In examining the respiratory organs, auscultation and percussion should be practiced by the surgeon, in order to determine with accuracy the character of the disease invading those organs.

Digestion.—The changes produced by surgical diseases as affecting the organs of digestion, arising from whatever source, demand careful investigation in forming a correct opinion of the existence of such disorders. I shall consider this subject under the heads of *Mastication*, *Deglutition*, *Hunger and Thirst*, *Vomiting*, *Hiccough*, and *Defecation*.

Mastication.—This function, when improperly performed, will lead us to suspect either a diseased condition of the teeth, or of the muscles moving the jaw. A cracking noise in the neighborhood of the ear, during the act of chewing, indicates disorder in the maxillary articulation; the escape of saliva, enlargement of the sublingual or other glands; swelling of the tongue may be attributed to cancerous affection, ranula, or other diseases affecting that organ.

Deglutition.—Deglutition is an act, that, independent of disease, is performed without difficulty or embarrassment; but, let the tonsils be inflamed or swollen, the uvula elongated and enlarged, or the pharyngeal or œsophageal orifice be at all inflamed or constricted, and it now becomes difficult, painful, and sometimes impossible. In harelip, or fissure of the hard or soft palate, food introduced into the mouth is oftentimes swallowed with difficulty, having a tendency to pass, in greater or less quantities, through the cavity of the nostril. In œsophageal stricture, or the formation of tumors or abscesses at or near that orifice, swallowing is often difficult, and spasms occasionally take place, most serious in their import, from the accidental course of a particle of food into the larynx.

Hunger and Thirst.—Hunger and thirst, in the healthy state, are removed by the introduction of food and drink into the stomach; but, if injury or disease oppose the introduction of these articles into the system, then insatiate hunger and thirst are the result. A recurrence of either of these, within a short time after a proper amount has been taken, may lead to a suspicion that the food has escaped at some point before entering fully into the system; hence wounds of the throat, stomach, artificial anus, are almost always followed by constant hunger.

Vomiting.—As a symptom of surgical diseases, vomiting is often of value in determining the character and extent of injuries. Blows on the head, falls, etc.,—especially in children,—are apt to be followed by vomiting, showing disorder of the cerebral functions. If to the vomiting there be added a tendency to sleep,

stertorous breathing, etc., concussion of the brain is likely to have occurred, which demands of the surgeon his most careful attention. After partaking of a hearty meal, blows upon the head are prone to produce vomiting, with removal only of the contents of the stomach, no serious consequences ensuing.

The character of the matter vomited is also diagnostic of the disorder or injury inflicted. Vomiting of blood may follow an attack of epistaxis: the blood, having been swallowed, coagulates in the stomach, and is ejected therefrom; but, when it arises from an injury or wound inflicted upon the stomach or throat, producing laceration or division of the vessels supplying these organs, it becomes a matter of more serious import. The vomiting that takes place during an attack of strangulated hernia is of a stercoraceous character, and is prognostic of the most fearful consequences. In intussusception, stricture of the bowels, etc., vomiting is an important symptom. The matters rejected are also stercoraceous, and more or less mixed with the contents of the stomach.

Hiccough.—Hiccough may be the result either of a wound of the diaphragm, irritation of the phrenic nerve by its compression from a tumor or other abnormal growth; or it may be the consequence of extreme nervous or vascular prostration, or of long-continued vomiting. The noise arising from the act of hiccoughing, is produced by the sudden and involuntary contraction of the diaphragm, and the simultaneous closure of the glottis, which arrests the passage of air in the trachea. It is sometimes a symptom of gangrene, and occurs as such in many morbid conditions; but it is frequently met with in persons otherwise in good health.

Defecation.—The character of the defecations in many instances is indicative of the actual conditions of the intestines. Hardened lumps, or "scybalæ," indicate constipation; while the mixture of pus or blood may lead to the suspicion of an abscess opening into the bowels; to the existence of fistulæ, hæmorrhoids, or to the development of cancer. In the natural condition of the rectum, and in a healthy state of the excretion, the fæces are usually round, of moderate size, and of the consistence of potter's clay while being worked. In stricture of the rectum, in an enlarged prostate gland, or in old and thickened hæmorrhoidal tumors, the stool will be found flattened, and smaller than in the natural state. In choleraic discharges, microscopical and chem-

ical investigations have shown that the evacuations are indicative of certain changes having taken place in the intestines; the rice-like dejections consisting of patches of epithelium removed from the mucous surface of the intestines.

Nervous Function. — The evidences furnished to the surgeon by the nervous system in cases of injury are of great value in determining the character of disorders. The existence or absence of pain, the loss or exaltation of muscular power, are more or less indicative of injury to the nervous system.

In some patients, there exists an abnormal sensibility to the action of disease or injury, accompanied with nausea, faintness, and great excitability of the nervous powers generally; while in others, this sensibility is so diminished or blunted that the most violent diseases manifest little or no excitement or derangement of the nervous power.

As a general rule, however, loss of sensibility, muscular power, or the extreme development of either, should be regarded as indicative of cerebral disorder.

SECTION III.

Use of the Senses in Forming a Diagnosis.

The impressions produced on the mind of the surgeon, in employing the use of the senses in forming a diagnosis of disease, are apparent to all. To observe critically and understandingly, it is necessary that a methodical use be made of the senses; calling into requisition, *first*, those of the most importance in discriminating diseases, and so on, according to their actual value. In this category I shall first place *Sight*, then *Touch*, *Hearing*, *Taste*, and *Smell*.

The Sight. — If properly cultivated and applied, sight is the most important and accurate of all the senses as a means of diagnosing disease, especially when applied to the external structures of the body. To be of value, then, the surgeon must become familiar with the appearance of healthy structure before he can rely upon the impressions made by disease. By the sense of sight a comparison should be made between the unnatural appearance of a part and that which is presented in a state of health, before any value can be assigned to its importance as a means of diag-

nosis. Thus, in fracture of a limb, in deformities from dislocation, in swellings caused by tumors and suppurations, and in the contraction of limbs and of the natural orifices, — by sight alone we can judge not only of the existence of the deformity, but also of its extent and magnitude. In addition to the change of form, the appearance of parts will give us increased evidence of the character of disease. Thus, *redness* may denote the existence of inflammation; a *copper-colored* spot, the probability of syphilitic taint; a *bluish-red* color, the formation of venous rather than arterial vascularity; a *livid* tint, the evidence of ecchymosis; and the *yellow* conjunctiva, the existence of hepatic disorder. By sight we can determine also change of structure. The character of wounds may be known by their edges; and their *depth* by the color of the blood escaping from them, the presence of muscular tendinous fiber, or by the appearance of nerves in their track. In *ulcers* we judge of their acute or chronic character by the appearance of the granulations and the nature of the discharges. In determining the nature of tumors, sight is of importance in demonstrating whether they are malignant or benign, smooth or lobulated, pendulous or pulsate; the variations in condition being subsequently ascertained by the assistance of the other senses. The *microscope*, by the means of sight, has given us much valuable information in determining the character of tumors and other morbid growths, and has become a valuable adjunct to other means in arriving at correct conclusions concerning the nature and treatment of surgical disorders. For a detailed account of the manner of using this instrument, and the uses to which it may be applied, the reader is referred to two excellent monographs* upon this subject. The use of the laryngoscope in detecting the diseases of the air-passages, and of the auroscope and ophthalmoscope in diagnosing diseases of the ear and eye, are made, by the use of this sense, important adjuvants in the investigation of disease.

The Touch. — The sense of touch, either alone or in connection with sight, is of almost limitless importance in its general applicability in the diagnosis of surgical diseases. The pulsation of aneurisms; the mobility of tumors; the crepitation of emphysema, of tendons, and of fractured bones; the movement of liquids, as in fluctuation; the position of the testicle in hydro-

* "How to Work the Microscope," and "The Microscope in its Application to Practical Medicine," by Lionel Beale.

cele; the sounding for stone in the bladder,—are cognizable to the surgeon chiefly through this sense. The *touch* may be practiced in surgery either through the direct contact of the fingers or of the palms of the hands. The forefinger, on account of its being the most convenient, is more often used, and is the best educated for the purpose of diagnosis. The tactile surface may be augmented by the apposition of the first and second fingers, by which their usefulness is increased in detecting swellings beneath the tissues, whether they are fluid or not. In larger collections of fluid, as in abdominal dropsies, the apposition of the entire palm of the hand on one side of the belly, while the opposite side is lightly tapped with the pulps of all the fingers of the other, will often indicate the presence of liquid by the sensation or succussion of the fluid against the palm. In practicing "the touch," great expertness is required, to attain which, frequent and repeated manipulation must be resorted to by the surgeon. In order to possess dexterity and skill in this manipulation, he should proceed as follows: Retain the fingers of one hand with sufficient firmness on one side. If the part to be examined is of considerable extent,—as the abdomen,—let him direct an assistant, as advised by Recamier, to press gently with one hand in the median line of the body, while he manipulates with his own hands as just stated. The motion of the intestines, as well as of the liquid wave, being thus partially checked, the sense of fluctuation, if yet apparent, will be almost certain evidence of the presence of liquid.

By touch, we can determine the existence of congestion in the superficial vessels, or of the activity of the capillary circulation, by alternately pressing upon, and quickly removing the finger from, the part. If, upon rapid pressure of the finger, and its equally prompt removal, the part quickly regains its livid or florid color, it indicates activity of the circulation; if it is slow and tardy in regaining its original appearance, the circulation is correspondingly weak and torpid.

The peculiar sensation of grating or "crepitation" felt by the friction of two broken fragments of bone upon each other, or the rubbing of two articulating surfaces of a joint together, or by that of a tendon in a thickened bursa, is manifest to the surgeon by the sensation of touch and hearing. Frequent errors in diagnosis, committed by some of the ablest surgeons, will attest the great importance of educating the fingers as diagnosticians in

many surgical disorders, whose nature can hardly be correctly understood without the light afforded by the sense of touch.

The Hearing.—By this sense the surgeon is frequently enabled to judge of changes in the organism by the intonation and variations of the patient's voice. Thus, in polypus of the nose the natural tone of voice is altered; and so with diseases of the larynx and trachea, fissures of the hard and soft palate, etc.

By the grating sound, denominated "crepitus," he is enabled to ascertain the nature of disorders as they affect certain structures; as, in the result of mortification, when gas collects in the cellular tissue, a certain crackling sound is heard as well as *felt*; and so in the *gurgling* sound that is often heard in circumscribed cavities, as in hernia; and also the peculiar whistling sound, that, during operations near large vessels, is heard when air enters a vein. In wounds of the thorax, the escape of air from, or the entrance of air into, the cavity of the chest, is diagnostic of the character of the injury affecting those organs.

The peculiar *thrill* in varicose aneurisms, caused by the flow of blood through the vessels, is indicative of the connecting of a vein with an artery. The elastic, "ripe-watermelon-like" sound produced by pressing upon encephaloid growths when they are connected with bone, and the *crackling* of the osseous shells of certain bony tumors, are all made apparent to the surgeon through the sense of hearing.

Percussion and auscultation are employed in ascertaining the true condition of the lungs in a state of disease; in determining the viability of the fœtus prior to operative interference; and in ascertaining the extent of effusions into the chest, in reference to the operation of paracentesis thoracis,—a few of the many instances where hearing is made an important adjuvant to a correct diagnosis. The application of the *sounding-board* to the vesical sound, to ascertain the presence of stone in the bladder, is another triumph of art in employing the sense of hearing for the detection of disease within the cavities of the body.

Taste and Smell were used by the older surgeons in determining change of structure and assisting the diagnosis of diseases, but are now rarely employed. By the aid of chemistry and the microscope, and the brilliant discoveries made through these channels, the two latter senses are rarely brought into requisition, and are, therefore, of little benefit to the profession in the investigation of surgical disorders.

PART II.

Bandaging, and other Points of Minor Surgery.

OPERATIVE Surgery, as understood in common language, is divided into two great parts,—*Minor or Auxiliary Surgery*, and *Major Surgery*. This distinction has for a long time existed in practice, though in reality there are no logical considerations that warrant such a division. There are no natural limits that can be established between minor and major surgery. Guy de Chauliac's work on Great Surgery, the first to take such a title, says nothing of minor surgery; and the Bertheonee, or small surgery of Paracelsus, has no resemblance to the minor surgery of to-day. Minor surgery, at the present, has reference to the mechanical part of those simple processes that are not only connected with operative surgery, but pertain to almost every day's experience in the practice of the profession.

A thorough knowledge of the operations of minor surgery is absolutely indispensable to the complete success of the surgeon. The ability to bandage neatly, and to perform skillfully the various minor operations to which he is ordinarily called, can never be secured by reflection or by a close application to books; but requires, instead, the experience of repeated practice. Through neglect to qualify himself properly in this most important branch, many a practitioner has placed his reputation and prospect of future success beyond the possibility of recovery, or has at least suffered severely from the criticism of those with whom he has been brought in contact.

For convenience and a systematic study of this subject, I propose to arrange Minor Surgery in chapters, representing the various processes hereinafter mentioned, viz.:

1. *Apparatus of Dressing.* 2. *The Handkerchief System of M. Mayor.* 3. *Duties of Surgeon and Assistants.* 4. *General and Local Anæsthesia.* 5. *Preparation and Manipulation of Instruments.* 6. *Incisions.* 7. *Means of Arresting Hemorrhage.* 8. *The Closing of Wounds.* 9. *Hypodermatism.* 10. *Aspiration.* 11. *Transfusion.* 12. *Electricity, Electrolysis, Galvano-Puncture,*

Acupuncture and the Galvano-Cautery. 13. Disinfectants and Antiseptics. 14. Catheterism. 15. Injections. 16. Vaccination. 17. Removal of Foreign Bodies. 18. Post-Mortem Examinations. 19. Poisons and Their Antidotes. 20. Effects of Heat and Cold. 21. Boils, Whitlow, Sprains, Onychia, Corns, Warts, etc. 22. Antiseptics and Antiseptic Dressings. 23. Fractures. 24. Dislocations.

CHAPTER I.

Apparatus of Dressing.

THE art of Dressing comprises every methodical application of mechanical and topical means whose object is the cure of surgical diseases. These are the smaller but important operations that the student or practitioner is obliged to call into daily requisition; and may be rightfully considered as perhaps the most useful in surgery.

Dressings are the different articles employed for the relief of injured parts, and to preserve them in proper coaptation, thus facilitating their union. They are also used to prevent a too hasty union; to protect the wound from the action of the atmosphere and external injury; to absorb discharges; to prevent desiccation of surface; and to insure cleanliness.

SECTION I.

The Apparatus of Dressing includes the Instruments for Dressing, and the Pieces of Dressing to be applied.

Instruments for Dressing.

The instruments which the daily avocations of the surgeon call for are of various kinds. For convenience they are arranged in what is known as a Pocket Case, which should contain *Forceps*; *Scissors*, straight and curved; *Probes*; *Directors*; *Spatulæ*; *Bistouries*; *Scalpels*; *Lancets*; *Catheters*; a *Porte-caustic*; a *Tenaculum*; *Needles*, straight and curved; and *Ligatures*.

Forceps.—The Forceps supplied are usually of two kinds: the *Polypus* or *Dressing Forceps* (Fig. 1), and the *Artery Forceps* (Fig. 2). The former are employed for removing dressings, in order to protect the fingers from irritating discharges, and also

to enable the surgeon to seize them with less risk of injury to the affected part. In using them, the thumb and second finger should be passed through the rings of the handle, and the fore-finger extended upon the joint of the blades, which renders them firm.

The *Artery Forceps* are like the Simple or Dissecting Forceps, with the exception of having a *slide* to keep them shut when necessary; each blade has also longitudinal grooves at the inner side of its extremity, that a firm hold may be obtained.

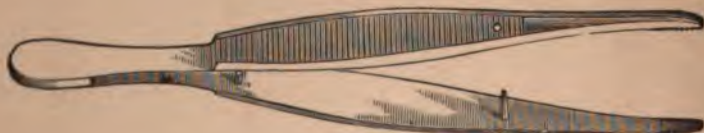
Fig. 1.



Fig. 2.



Fig. 3.



Scissors are of two kinds,—Straight and Curved. The use of the former is so apparent that no description is required. The best form of the curved is obtained by their being bent at the joint. They are mainly required to effect the removal of such dressings as adhere closely to the body,—such as adhesive strips, bandages, etc.

Probes are intended as substitutes for the fingers; but, in all cases where it is possible to introduce the finger, it should be preferred, especially in gunshot wounds, on account of the greater accuracy of the touch. They should be flexible, and made of silver, to prevent their liability to be injured by contact

with the various fluids which they may meet. They should also be of different sizes; and one should be made with an eye in its flattened extremity, for the purpose of being armed, if necessary, with a ligature of silk or a piece of tape.

The Director is simply a broad probe with a groove in it, which is used to direct the scalpel or bistoury in the severing of deep-seated parts. When employed, it should be held with the thumb on the top of the handle, and the fingers beneath its shaft, to prevent its slipping. The knife, being held in the other hand, is then made to pass along the groove as far as desired.

The Spatula is used in spreading cerates, in the preparation of dressings, or for removing substances which remain adherent to the skin, and for depressing the tongue.

Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Bistouries and Scalpels are of various shapes and sizes. The Scalpel is simply a knife with a convex cutting edge, whereas a Bistoury is either straight or curved. The latter are usually four in number, two curved and two straight (Figs. 4, 5, 6, 7); one of each pair being sharp-pointed, and the other ending in a probe or button-point. The size of either instrument used

will depend much upon the fancy of the surgeon, and the character of the operation to be performed.

Fig. 8.



Abscess Lancets are so simple, and their use so manifest, no description is accounted necessary.

Catheters are made of either gum-elastic or silver, the latter being preferable. They consist of tubes of various sizes, and are curved more or less, near their rounded extremities. They are of two kinds, one being adapted to the urethra of the male, the other kind to that of the female. The two are, however, sometimes united into what is called a *double catheter* (Fig. 8). It is of silver, and consists of three pieces, as represented in the accompanying cut: A, a straight tube about five inches long, having at its upper extremity two rings opposite each other; at the other end is cut a screw-thread, fitting either of the two tips, B or C; the former short and slightly bent, for the female; the other long and curved, so as to suit the male urethra. Near the lower extremity of each tip are cut two fenestræ, communicating with the cavity of the tube.

The Porte-caustic.—The Porte-caustic, or Caustic-Holder, has its use indicated by its name. It should be made of platinum, or of silver with platina ends, enclosed in a hard-rubber tube. When it is required to give the caustic a fine point, it is best accomplished by rubbing it with a wet rag; as the brittleness, especially of Nitrate of Silver and Sulphate of Copper, renders it difficult to bring them to a point by scraping them with a knife.

The Tenaculum is a hook with a long curve, and sharp at the point. It is employed for the purpose of drawing bleeding

arteries from the surrounding tissues, by inserting it into their open extremities, that they may be conveniently ligated. The artery forceps is designed to perform the same office, and in most cases is preferable to the Tenaculum.

Needles.—The Needles used by the surgeon are either straight or curved. The latter should be doubled-edged from the point to the widest part, and very sharp, with either round, two-edged, or bayonet-shaped points. They should be of sufficient size to make an opening large enough to prevent any dragging of the skin as the suture is drawn through. The accompanying drawing represents two forms of the surgeon's needle, of which the straightest will usually be found the most convenient. Another variety of needle is the one set in a permanent handle, the eye being placed in its point: it may be also used with a needle-holder.

Fig. 9.



A needle invented by Prof. Post, of New York, is designed to facilitate the introduction of insect pins in wounds of the face and other parts requiring perfect adaptation. It consists of a needle about two and a half inches in length, straight except at the point, where it is slightly curved to the extent of half an inch, and expanded into a small flat handle at its proximal end. The curved extremity is flat, with cutting edges, while the greater portion of the length of the needle has a groove on the side corresponding with the convexity of the curve. The needle is used by passing it through the lips of the wound in the position to be occupied by the pin, after which the latter is inserted along the groove and the needle removed. The pins are there held in position by a thread arranged in the form of a figure 8.

The needle constructed by Dr. G. S. Bryant, of St. Louis, differs from the above in being bent at a double angle near its proximal end, by means of which the handle occupies a higher plane than the grooved part of the needle. Another ingenious needle, invented by Dr. Bryant, is the vesico-vaginal needle, which is used for coaptating the edges of fistulæ within deep cavities.

The *Aneurism Needle*, represented in Fig. 10, is employed to effect the ligation of an artery that has retreated within the tissues beyond reach. In this case it becomes necessary to cut down upon the bleeding artery at the most convenient point above the wound, and tie it at that point. After the sheath of the vessel has been opened, the needle is used by passing its extremity, armed with a double ligature, under the artery and out on the opposite side; one division of the ligature is then secured between the fingers, or by a forceps, and drawn out upon one side, while the other portion follows the needle as it is withdrawn from the other side of the wound. The artery is then tied.

Fig. 10.



The Ligature.—A Ligature is a strong cord composed of silk, linen thread, or catgut, and used to arrest the hemorrhage of a wounded vessel: it is also occasionally employed in the removal of tumors.

Metallic ligatures are made of silver, platinum, gold, iron, or lead; and are employed with a needle, grooved to admit the wire to lie close within, so as not to obstruct the passage of the needle through the skin.

Dr. Lister's catgut ligature is now largely employed for tying vessels or applying sutures to the viscera.

The *whale-tendon ligature* is a recent invention, and was first brought to the notice of the profession by Dr. T. Ishiguro, Chief Surgeon of the Imperial Medical Japanese Army, Tokio, in 1874. This ligature is made, as its name implies, from whales' tendons, dissected out and teased until the fibers look like those of hemp. These are spun together as ordinary silk thread. It is said that complete absorption of this ligature takes place in from seven to ten days. Many tests have already been made to ascertain if its speedy absorption would give rise to secondary hemorrhage, which have resulted satisfactorily, after having been tried in hundreds of cases. It has been employed quite extensively in the military hospitals in Japan since 1877, superseding all other kinds of ligature. A few of the leading surgeons of this country have used it successfully. It can be soaked in Carbolic

The kind of knot to be preferred is a matter of some moment. I regard what is called the "surgeon's knot," which is made by passing one end of the ligature *twice* around the other, as highly objectionable; as it is exceedingly bungling, and possesses no superiority over the *double* or "sailor's knot;" unless, indeed, the operator neglects to have his ligatures properly waxed,—*a precaution which should never be overlooked*,—in which case it is not quite so liable to slip as the "sailor's knot" while the subsequent part of the knot is being made. The "sailor's knot" is much more rapidly executed, and presses more uniformly upon the entire circumference of the vessel. It is made in the following manner: 1. Pass the end of the ligature held in the right hand, *from* you, once around the corresponding end of the ligature held in the left hand. 2. Pass the end of the ligature in the left hand, *toward* you, once around the other end, and the knot is complete.

It is imperative in all cases that the ligature be drawn with the requisite degree of firmness to cut entirely through the internal and middle coats of the artery, in order that sufficient inflammatory action may be produced in the vessel to agglutinate its sides, and thus render the channel impervious. One end of the ligature should then be cut off within about a quarter of an inch of the knot, to diminish the amount of irritating matter left in the wound. The length of time during which the ligature should remain around the artery will vary according to the size of the latter; generally from five to twenty days may be considered as elapsing before the external coat becomes severed at its point of constriction. The ligature may be gently twisted and drawn upon, in order to favor its release, as sometimes it is retained by the granulations in which it is imbedded. No *force*, however, should ever be used, particularly when large arteries have been ligated, lest an unexpected secondary hemorrhage occur.

Miscellaneous Apparatus.—Under the head of Apparatus of Dressing, also, the operator should, in the more important cases, include *Basins, Towels, Buckets, Sponges*, etc. The latter, as obtained in the shops, are not fit for use without being subject to a cleaning process. This consists, first, in their maceration in boiling water, and subsequent beating, to remove the calcareous particles; they should then be macerated in water acidulated

with about one-thirtieth of its bulk of chloro-hydric acid; dried and beaten again, and then bleached by exposure, when moist, to the vapor of chlorine, or some other decolorizing agent.

The Pieces of Dressing.

The Pieces of Dressing include *Lint*, *Charpie*, *Cotton*, *Tow*, *Ointments*, *Liniments*, *Compresses*, *Maltese Cross*, *Shields for Amputations*, *Adhesive Strips*, *Collodion*, *Plasters*, *Poultices*, and the *Application of Water*.

Lint.—This is a soft, fleecy substance, obtained by unraveling old linen. The linen selected should be soft and clean, from use and washing; as, for example, an old *table-cloth*. The "Patent Lint," as prepared by druggists, is in no wise preferable to the Domestic Lint: the latter can be made at a moment's notice, by scraping the surface of the linen, previously put on the stretch, with a sharp knife. They are both employed as primary dressings, either dry, spread with ointments, or saturated with some kind of lotion.

Marine lint, prepared of oakum, has obtained considerable favor among surgeons, on account of the antiseptic and astringent properties of the tar acid which it contains, and, though of coarse fiber, answers a good purpose for dressings. I have employed it in deep wounds, such as those of excisions of the hip-joint and shoulder, and found it very serviceable.

Charpie.—Charpie is made by collecting the unraveled threads from pieces of old linen four or five inches square. It is commonly divided into two kinds, according to the length and fineness of the thread composing it: that which is long and coarse being of service to prevent the closing of sinuses or fistulæ; while the more fleecy, finer kind is placed in direct apposition with the part, particularly if the surface require stimulation.

Many arbitrary names have been applied to the various forms which Charpie may be made to assume as an element of surgical dressings. Thus, we have the *Pledget*, *Roll*, *Tent*, *Mesh*, *Bullet*, *Tampon*, *Pellet*, etc., each of which has its peculiar use and advantages.

The Pledget.—The pledget is a mass of Charpie, with the threads arranged parallel with each other, and the ends folded underneath. It is then pressed by the hands into the required

shape. After being neatly adapted to the part it is designed to cover, it is usually spread with Cerate, care being taken not to make it so thick and bungling as to heat the surface of the wound, nor yet so light as to admit of its becoming immediately saturated with the discharges.

The Roll.—This is a smaller mass of Charpie, which is rendered cylindrical by rolling it between the hands, and is then firmly tied with a cord in the middle. It is chiefly used to arrest hemorrhage, by pressure, from deep-seated vessels, or to absorb the secretions from wounds or cavities. A director, probe, or dressing-forceps may be found necessary in order to carry it sufficiently far into deep wounds. And, for convenience of withdrawing the mass, the string attached to it may be left projecting from the orifice.

The Tent.—This is made by twisting a mass of Charpie into the form of a cone. It is used to dilate fistulous openings where only a moderate degree of dilatation is required. It is, however, much inferior to the *Sponge Tent*, which is prepared by soaking common sponge in melted beeswax, permitting it to cool and harden while under moderate pressure, and then slicing it into pieces of the required size. The dry, compressed sponge, prepared by allowing it to remain in a vice for a few hours, is highly recommended, and is very useful.

Sea-tangle tents are also employed for expansion.

Paper.—The use of paper as a surgical dressing has produced most excellent results. It has been employed quite extensively in hospital practice, and is said to answer all the requirements of lint. The soft blotting paper is used for stanching hemorrhage, and has long been known as an efficient remedy. *Waxed Paper* has also been used as a substitute for oiled silk or India-rubber cloth, and answers an excellent purpose.

The Mesh.—This is formed of threads of Charpie, placed parallel with each other, then bent upon themselves and left loosely floating. It is used more especially in the treatment of fistulæ in ano. When thus employed, it should be covered with some lotion or cerate, and introduced into the cavity on the point of a probe. It acts by preventing the orifice from healing, thus enabling the cavity to granulate from the bottom.

Bullets.—These are made by rolling Charpie between the hands, until it acquires the form of a ball. They are exceedingly porous, and hence very absorbent; and are of use in filling cavities and preventing pus from burrowing.

The Tampon.—When a number of bullets are placed together for the purpose of distending a cavity or of arresting hemorrhage, they assume the name of Tampon. A large ball alone is also sometimes called a tampon. They are used in gonorrhœal inflammations of the vagina; in leucorrhœa, and in uterine hemorrhage. In arresting the latter, especially if it occur from violence, they may be made of the *Boletus Igniarius*, or Puff-ball, and used with the most marked success.

The Pellet.—This consists of a ball of Charpie enclosed in a piece of soft linen and firmly tied. It is frequently employed in the treatment of umbilical hernia of children, where it supplies the place of a truss. It is also sometimes used as a tampon.

Cotton.—Cotton is much inferior to Charpie as an article of surgical dressing, in view of the fact that it is less absorbent and much more irritating; though during the late war it was very neatly prepared and quite extensively used in the army as a substitute for Lint and Charpie. Its chief recommendation, however, is its use as a covering to extensive superficial burns, to protect their sensitive surface from the action of the air, and at the same time absorb the discharges. It is highly useful, also, to form a soft bed upon which to rest an injured part; to prevent unpleasant pressure and excoriation from bandages and other apparatus; and to envelop parts when the natural temperature has become depressed.

Tow.—This material is of very questionable utility as an article of dressing, as it is exceedingly harsh and irritating; and, if the pledget used be too thick, it irritates the wound, and union is thus retarded. It may be employed, however, as an outer dressing to stumps which are discharging copiously, in order to protect the bed.

Bran and Sawdust.—*Bran* has been employed by Dr. J. R. Barton, of Philadelphia, on account of its cleanliness in many cases of compound fracture, where there is much suppuration. It is applied in fracture-boxes or in junk-bags. Its cheapness, and the readiness with which it is obtained, make it a desirable dressing, especially in warm weather. *Sawdust* is sometimes used as a packing in fracture-boxes.

Ointments.—Ointments are any soft, unctuous substances or compounds of a consistence that renders them conveniently

applied. They are used locally to retain any desired remedy in close contact with the diseased part.

Liniments.—Liniments are designed to be applied to the skin by friction with the hand, or with soft flannel. Oil should constitute the basis, and any remedy may be combined with it for local use. When the remedy is also administered at the same time, it is usually attended with the best results.

Compresses.—Compresses are made of various materials, as linen, muslin, flannel, calico, etc., and usually applied over other dressings. They have received a variety of names, according to their form and the indications which they are designed to fulfill. Thus, we have the *Square*, *Oblong*, *Triangular*, and *Cribriform*; the *Maltese Cross*, the *Half-Maltese Cross*, the *Single* and *Double Split Compress*, the *Perforated*, the *Graduated*, and the *Pyramidal*.

The *Square Compress* is that in which the substance used is doubled so that the length and width are equal. When folded so that it is twice as long as it is wide, it constitutes the *Oblong Compress*, and is used in surrounding the trunk or limbs. If the square piece be folded by uniting two of its angles, it forms the *Triangular Compress*. This is of excellent service in confining dressings to stumps, where it is necessary to change the dressing frequently without disturbing the limb. It should be of sufficient size to surround the limb, and should be applied as follows: Place the stump in the center of the side *b c*, Fig. 11; then, turning the apex *a* over the end of the stump, the other points, *b* and *c*, should be turned up, and the ends fastened by the use of pins. When it is desirable to renew the poultice, or whatever other dressings are used, withdraw the pins, and, turning back the ends of the compress, the surface is readily exposed.

Fig. 11.



The *Cribriform Compress* is made by folding a square piece of linen several times upon itself, in the form of a square, and then nicking the sides with the scissors, removing small triangular pieces. On opening it, we shall have the form represented in Fig. 12. This, spread with Calendula cerate, constitutes a very valuable dressing for suppurating surfaces.

Fig. 12.



The Maltese Cross.—The Maltese Cross, so named from its form, is prepared by folding a square piece of linen through the middle or one of its sides, then doubling this so as to form a square; after which, join either of the two angles to form a triangle, as in Fig. 13. From the hypotenuse of this triangle

Fig. 13.

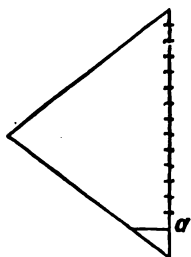
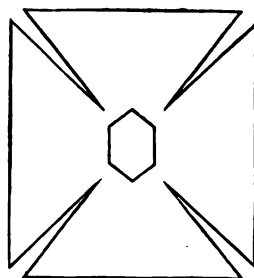


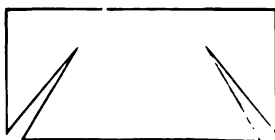
Fig. 14.



remove nearly half an inch from the apex, which consists of folds without free edges: this leaves a space in the center. Then make an incision along the hypotenuse to within half an inch of the line *a*. On opening the linen we have the cross complete (Fig. 14). It is used as a direct application to stumps, being previously spread with cerate.

The Half-Maltese Cross.—This makes a convenient dressing for stumps at the shoulder or hip-joint. It is made by folding a piece of linen in the form of a parallelogram, and then carrying

Fig. 15.



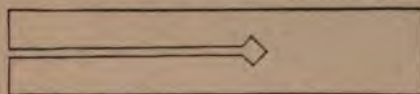
an incision from the two angles having free edges to within a couple of inches of the folded sides (Fig. 15). By opening the linen, doubled and cut in this manner, it will also form the cross (Fig. 14). The student should practice making them of paper, that he may be expert when called upon to make them

for actual use. Indeed, the same may be urged of many of the dressings; as repeated practice is one of the essential elements of success.

The Retractor.—This is made from an oblong piece of muslin, and may have *two or three tails*, according as there is one or two bones to be divided by the saw. The *retractor of two tails* (Fig. 16)

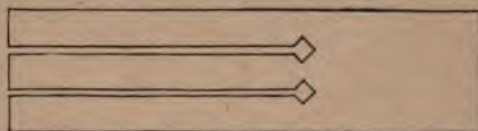
is employed to protect the soft parts where there is but one bone to be divided. In making an application of it, draw the tails downward on each side of the stump, at the same time drawing the body of the retractor upward over the stump. The muscles are thus forced backward and protected from the action of the saw.

Fig. 16.



The *retractor of three tails* (Fig. 17) is applied in a similar manner where there are two bones to be divided,—the middle tail passing through the interosseous space. The diamond-shaped opening, at the end of each incision, is designed to adapt the retractor more perfectly to the bone.

Fig. 17.



The Perforated Compress.—This consists of muslin folded several times upon itself, in the center of which a circular opening is cut. By means of this opening, points which have a tendency to slough, are relieved of pressure; as, for example, the internal condyle in injuries of the elbow; the trochanter of the femur, and the heel, in fractures of the lower extremity.

Graduated Compresses.—These are of several varieties; the difference consisting in the manner in which each is folded. In the first form, each fold is so arranged as not entirely to cover the one previously made. It may be graduated at one or both extremities. (Fig. 18.)

Fig. 18.



Fig. 19.



The Pyramidal Compress.—This may be either square or oblong. It is very neatly made by placing square pieces of muslin,

each smaller than the preceding, one upon the other, and then fastening them together, which form a pyramid (Fig. 19). They are used for making pressure upon particular parts, as in cases of hemorrhage from deep-seated vessels.

Adhesive Strips.—These are designed to facilitate the union of wounds by approximating their edges and protecting the surface from the action of the atmosphere. They constitute one of the most indispensable articles of dressing employed by the surgeon.

For application a strip should usually be cut off one-half or three-quarters of an inch in width, and warmed by being held near a fire; by wrapping its unspread surface around a bottle of boiling water, which is preferable; or by moistening it with warm water, applied with a soft sponge. The strip should then be applied first to the most depending portion of the wound, in order to draw it up to the other, and should never be applied from above downward. Care must also be exercised that a proper space be left between the strips to admit of the free escape of the discharges.

Collodion.—This very useful and convenient adhesive material is made by dissolving gun-cotton in sulphuric ether. After approximating the edges of a superficial wound, it is generally sufficient to paint the surface a few times with a camel's-hair pencil; but, in more severe injuries, it is well to lay strips of muslin, linen, or kid, saturated with the solution, on the wound, and then press upon the part until dry. The Collodion can readily be removed by dissolving it away with ether.

Plasters.—Plasters are made of various substances; as, for example, the *soap plaster*, which is very mild and unirritating, and preserves the integument soft and moist, being, also, an excellent preventive of excoriation. The *Mercurial plaster* is sometimes employed as a resolvent of tumors and other indurations. The *Belladonna plaster* is occasionally used as a curative agent. The preparation of them belongs properly to the pharmacist, though the surgeon should regard it his duty to see that they are of the requisite shape to fit accurately the part to which they are to be applied. In adapting a plaster to the female mammæ, for example, a circular piece is required, with a round opening in the center large enough to admit the nipple, while the circumference of the piece should have several incisions reaching one inch toward the center. In general, however, plasters are little used

in Homœopathic practice, their use being superseded by the administration of internal remedies and external *medicated* lotions.

Poultices.—The Poultice, or Cataplasm, was formerly one of the most common articles of dressing, both in domestic and professional practice. It is made of a variety of substances, and is intended to cover injured or inflamed surfaces, the kind of poultice used being varied according to the object to be attained by its application.

The *Emollient Poultice*.—This application may consist of bread and milk, bread and water, bran or corn-meal with water, or of flaxseed meal. The latter forms a very excellent poultice. It is prepared by pouring sufficient hot water upon the meal to give the mass a soft consistence. It should then be spread upon a piece of muslin, and leveled smoothly and of a uniform thickness of one quarter or half an inch. The edges of the muslin should then be reflected upon it on every side for the space of about half an inch, so as to form a kind of frame. Every poultice should invariably be renewed before it becomes dry and hard. Its moisture can be retained much longer by covering it on the outside with a piece of oiled silk, which it is always advisable to do.

The *Stimulating Poultice*.—This is made of different substances, as boiled carrots, grated to a pulp; raw potatoes, grated, and applied cold; grated horse-radish; slices of garlic; black pepper; yeast alone, or yeast or porter with corn-meal; solutions of chloride of lime or of soda, of creosote, or of common soap.

The Application of Water.—*Water Dressings* may be cold or warm, simple or medicated, and are intended to keep the parts constantly moist, and by their physiological effect diminish inflammatory action. They are of invaluable service in compound fractures, gunshot wounds, sprains, dislocations, and after amputations, especially if there be excessive reaction. Where there are suppurating surfaces following compound fractures, gunshot wounds, amputations, etc., the water should be medicated with *Calendula*; whereas *Arnica* is more applicable to sprains, dislocations, bruises, etc.

Irrigation.—Irrigation is successfully effected by suspending a vessel, containing medicated water of the required temperature, at a convenient height over the injured part, and then forming a communication between the latter and the water in the vessel.

by means of strips of lint twisted together, or, what is better, pieces of cotton wick: the wick, being wet previous to its application, forms a siphon. In order to prevent the clothes of the patient or the bedding from becoming wet, the limb, previously covered with folds of moistened lint or soft linen, should be laid upon a pillow protected by a piece of oil-cloth, so arranged as to form a sort of gutter, along which the water may pass into a vessel below. A still more preferable method of accomplishing the same purpose is secured by the use of an apparatus with a stop-cock, by which the size of the stream can be regulated at pleasure (Fig. 20). The sensations of the patient should invariably be consulted respecting the propriety of continuing or relinquishing this mode of treatment. In general, it may be continued so long as it is agreeable to the patient; but it should be at least *suspended*, if not entirely *dispensed with*, provided it induce chilliness or an increase of pain.

Fig. 20.



The Douche, or Shower-Bath.—The Shower-Bath is sometimes applicable to cases where it is desired to invigorate the vital functions generally, or to increase the activity of any particular part of the body. Its good effects are most clearly manifested in local paralysis, as of the lower portion of the spine, of the sphinc-

ter muscle of the anus, or of the neck of the bladder; also, in a similar condition of some of the voluntary muscles,—as the deltoid, for example,—resulting from an injury. It can be conveniently applied by pouring the water from the nose of a tea-pot or pitcher, having the vessel used elevated to a suitable height above the patient.

Bathing.—Bathing constitutes a very important adjunct in the treatment of many surgical diseases; but should always be conducted with care, as otherwise it may prove a source of formidable mischief. The temperature of the bath may vary from 33° to 112° F., according to the peculiarities of the case. The feelings of the patient, guided by the judgment of the surgeon, form the only safe and rational guide to the temperature of the bath to be employed; since a degree of temperature which would prove agreeable and of service to one person, might produce a severe and injurious effect upon another.

The Warm or Hot Bath.—This is occasionally used as a depressing agent in overcoming violent pain in excessive nervous excitement; spasmodic muscular contraction in the reduction of dislocations; spasms of the neck of the bladder; to assist in the return of hernial protrusions, and the like.

Partial Baths.—The pediluvium or foot-bath, the hip-bath, the hand-bath, and other partial baths, are often used with benefit. The *hip-bath* is a very effective agent in acting upon the lower part of the spine, and particularly upon the pelvic organs. It may be taken in any vessel of convenient size, though one of the form represented in Fig. 21 has the advantage of being so made as to afford support to the back while sitting. In using the *hand-bath*, the water should be applied hastily, not keeping the parts long exposed; after which the surface must be carefully rubbed with dry towels, when a glow may be produced by friction with the *dry hand*, which is preferable to the use of a towel or flesh-brush for this purpose.

Fig. 21.



Application of Dressings.

By the observance of *method* in the application of dressings, the surgeon can very materially lessen his labor: at the same

time he will be in no danger of injuring his reputation through negligence or want of knowledge as to what is required in any particular case. Though it is impossible to give directions which would prove applicable in every instance, still, general rules can be prescribed that will be advantageous to the young surgeon in enabling him to anticipate the awkward position he might be suddenly placed in by not making a proper selection of assistants, or by failing to have in readiness the necessary articles which are to constitute the dressing.

1st. A suitable number of reliable and efficient assistants must be procured, to each of whom special duties shall be assigned, with the instruction that *they are to observe these duties, and nothing else*. This prevents confusion. 2d. Before exposing the affected part, the patient should be placed in such a position that the assistants can perform what is required of them without interfering with each other, thus preventing hasty, inconsiderate movements. 3d. The surgeon, as a general rule, should place himself on the outside of the limb, with his face to the patient. 4th. The dressings to be employed should be prepared beforehand, not omitting to have sponges, vessels of water, warm or cold, castile soap, towels, etc., in readiness. 5th. During the dressing, the bed and clothes of the patient should be protected by water-proof cloth, or by so holding the part that the discharges and the water used in cleansing may flow into a vessel. 6th. Let the surgeon exercise great care lest he leave the patient in such a position as to occasion unnecessary fatigue.

SECTION II.

Bandaging.—The Simple Bandage, or Roller.

By Bandaging is meant the confining of dressings or other surgical apparatus in their proper place, by means of pieces of muslin or other material.

Bandages are of several kinds, deriving their names either from the direction which they take, from their peculiar form, or from the particular purpose they subserve. They are simple when formed by the application of the roller; compound, when made from one or more pieces adapted to the size and conformation of particular parts. The Simple Bandage, or Roller, is subdivided into the *Circular, Oblique, Spiral, Figure-of-8, Spica,*

and *Recurrent*; the latter, or *Compound*, into the *Uniting*, *Dividing*, *Compressing*, *Expulsive*, *Retaining*, etc.

The Roller is usually prepared from muslin, calico, linen, flannel, cloth, or gum-elastic, by tearing it from the piece into bands from one to four or more inches in width, and from a few inches to ten or twelve yards in length. It should be free from hems, soft, pliable, and unglazed, to prevent it from slipping. Rollers are of two kinds, according as one or both ends are wound into cylinders.

Fig. 22.



The *Single-headed Roller* (Fig. 22) consists of two extremities; one of which, the terminal, is in the center of the cylinder, the free extremity being the part remaining unwound. Between the two ends is the body, and the two surfaces, an external and an internal.

The *Double-headed Roller* (Fig. 22) consists of the same parts as the single one, with the exception of the free or initial extremity, which is also wound into a cylinder.

The rolling of the bandage may be accomplished with a machine, or by hand. A very simple and easily constructed machine for this purpose is represented by Fig. 23. One end of

Fig. 23.



the roller being placed on the spindle, *a*, the other is to be held in the left hand to direct its course, and thus insure its being wound evenly, while the crank, *b*, is turned with the other hand.

The surgeon, however, is not always able to avail himself of such aid when bandages are required; hence, a knowledge of the proper mode of manufacturing a roller by hand becomes a matter of importance. The following directions will show the process to be very simple, and a little practice will enable him to roll them rapidly: Place the terminal end of the band upon the thigh, and double it five or six times upon itself, to form an axis around which the remaining part of the band can be rolled. Then roll it between the hand and thigh a few times until it becomes sufficiently firm to be held between the thumb and finger without yielding. Then allow the body to run over the right forefinger, seizing it firmly between this finger and the thumb, so as to make traction. Now cause the cylinder to revolve by means of the last three fingers of the hand in which it is held; at the same time the thumb and finger holding the body of the roller should be made to revolve partially around the cylinder. By this compound movement the roller can be very quickly and neatly made. Fig. 24 will explain the directions.

Fig. 24.



A roller designed for the body should be twelve yards long and usually four inches wide; when intended for the head, five yards in length by two inches in width; when for the extremities, eight yards in length by two to three inches in width, according to the size of the limb. A finger or penis bandage should be about one inch wide. In applying the roller, the surgeon commonly carries it from left to right, or from without inward for the right arm or leg, and from

within outward for the left. The roller being unwound to the extent of three or four inches, the cylindrical part is grasped firmly between the thumb and fingers, so that it lies very nearly in the hollow of the hand; while the initial extremity is held in the other hand by pressing the fingers firmly against the palm, the thumb pointing toward the side from which the turns are to be carried. Now, placing the *external surface of the initial*

end upon the limb, retain it by the pressure of the fingers until one or two turns are made around the part, so as to secure this end, after which the roller may be continued up the limb in the manner to be described hereafter.

I. — The Circular Bandage.

The Circular Bandage is formed by horizontal turns of a roller, each of which overlaps, or very nearly so, the preceding one (Fig. 25). These bandages are very simple, and are applied to the forehead, eyes, arms, and lower extremities. The terminal end of a bandage, whether circular or of any other kind, may be fastened by the use of pins, or by employing small, narrow bands. The pins may be applied in a line with the length of the roller or transversely (Figs. 25 and 26). If, however, the pin be placed as represented in Fig. 26, the head looking from the end of the roller, it will be likely to be withdrawn by the action of the roller itself. Some surgeons prefer securing the terminal end of the roller by means of tape, or by slitting the end of the bandage into two strips, tying them in a bow-knot; but this mode of fastening is only preferable in bandaging the penis, fingers, or toes.

Fig. 25. Fig. 26.



II. — The Oblique Bandage.

This bandage differs from the Circular, in that it ascends the limb rapidly and very obliquely, leaving an interval between the turns. (Fig. 27.)

Fig. 27.

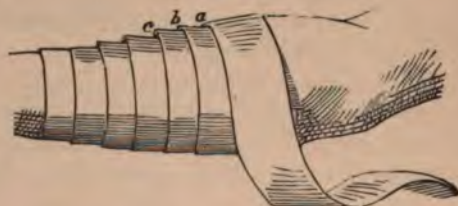


Use.—It is employed principally to retain dressings; though it is sometimes used with other bandages in particular cases, to which reference will be made hereafter.

III.—The Spiral Bandage.

The Spiral Bandage ascends the limb gradually, the turns being in such relation to each other that each succeeding one covers in a portion of the turn which preceded it, thus completely enveloping the surface to which it is applied. Owing to the circumstance that the parts requiring this bandage are more or less conical, especially the extremities, it is plain that, in ascending the arm, for example, passing from the apex of a cone to its base, one edge of the roller will press upon the surface, whereas the other will be entirely free, thus making the openings called *gaps*,—*a, b, c*, Fig. 28. The injury to result from having a bandage thus applied is apparent; hence, in order to equalize the pressure, the roller is, at each turn, half folded upon itself, making what is called a *Reverse*, which cannot be neatly and properly made without frequent practice; and, as it is a matter of importance, the following rules are given:

Fig. 28.



1st. Holding the roller as previously directed, make the simple spiral, *without the reverse* so long as both edges of the roller press equally upon the part; when the swell of the muscles is reached; place the left forefinger on the middle of the bandage, where the fold is to come, in order, simply, to prevent the turns already made from becoming relaxed. (Fig. 29.)

2d. Slacking the roller between this point and the cylinder, rotate the latter on its long axis by pronating the hand, taking care not to allow the cylinder to sink below the level of the limb till the reverse is complete.

3d. Keep the edges parallel, permitting each succeeding turn to cover in about one-third of the preceding one.

4th. While making the reverse, keep the body of the roller perfectly slack, drawing it sufficiently tight *after the fold is made*.

These reverses are wholly indispensable where the limb is not uniform in size; and, as their formation is the most difficult point

in the application of the roller, it is proper to urge the necessity of the surgeon becoming thoroughly acquainted with the above rules. A little actual practice is all that is required to become expert, recollecting especially, that, *while making the reverse*, no traction should be made, nor the cylinder sunk below the limb, nor held more than six inches from the middle of the turn.

Fig. 29.



The degree of tightness to be observed in the application of the roller is a question worthy of attention; for, unless a bandage be properly adjusted, it had better be dispensed with entirely. If it be too loose, it cannot fulfill the indications presented, and, if too tight, may produce gangrene. But above all things should the surgeon avoid the culpable practice of wetting the bandage in order to make it adapt itself more perfectly to the part. This practice is liable not only to produce the most intense pain, but is likely also to occasion gangrene, thus exposing the life of the patient. It is not possible to calculate how much the roller will shrink in drying; and hence no one can estimate the degree of pressure which will be produced. But the degree of traction requisite can only be determined by the peculiarities of each individual case; though it may be stated, in general, that a bandage is applied in accordance with the indications to be pursued, when it lies evenly and presents a finished appearance, relieving the sufferings of the patient, and which does not of itself become a source of irritation and pain in the course of two or three hours.

There are repeated examples to show that the tendency of all inexperienced dressers is to draw the bandage too tightly, instead of falling into the opposite extreme. Practice only can make perfect; and hence it will afford a valuable lesson to the young surgeon to give some other person the benefit of a roller, to determine the amount of traction that can be sustained without inconvenience; or, what will be still more instructive, let him permit the second person to apply the roller to one of his limbs, when the pain which will be occasioned through want of skill will be likely to suggest healthful reflections respecting his own want of experience.

The Spiral has been divided into several kinds, according to the parts of the body which it is designed to cover. Thus, we have the Spiral of the Chest, of the Abdomen, of the Upper Extremity, of the Finger, of all the fingers, or Gauntlet, of the Penis, and of the Palm, or Demi-Gauntlet; together with the Spiral of the Lower Extremity, including the Spiral of the Thigh, of the Leg, of the Foot, and of the Toes. We have also the French Spiral, which is but a slightly different form of bandage from that last named.

The ability skillfully and neatly to apply and adjust the roller is of very great importance to the surgeon; and the time which the young dresser devotes to its acquisition is well spent. It can only be gained by frequent practice. Verbal descriptions, and the best-executed illustrations, should be considered merely as guides and aids; they cannot impart practical skill, any more than the perusal of volumes on anatomy, to the exclusion of dissections, can render the student acquainted with the mysterious construction of his material frame. Let each one, therefore, spend a few leisure moments every day, with some companion, in the practical application of the roller. At first, reference to some book on bandaging will be necessary; but, after a certain degree of skill has been acquired, the volume may be laid aside; the student's good sense, and the familiarity which he has already gained with the mode of bandaging, combined with his knowledge of the particular object to be attained in each case, will be his best guides and his best advisers.

1. Spiral of the Chest.—This bandage requires a roller twelve yards in length by three inches in width.

Application.—Place the patient in such a position as will make it convenient to pass the roller around the back. Confine the initial end of the bandage on the waist by making one or two circular turns from left to right; then direct the succeeding turns spirally up the chest, covering in one-third of each previous turn,

Fig. 30.



until the axillæ are reached; from the left axilla conduct the roller obliquely in front of the chest to the base of the neck, around which pass to the right axilla; make one other similar turn, after which descend the chest by oblique turns to the point of starting. In the cut (Fig. 30), the terminal end of the roller is represented as passing from right to left instead of from left to right.

Use.—To confine dressings on the thorax in case of wounds; to assist in the coaptation of the fragments of fractured ribs; and in fracture of the sternum. In the two last cases, compresses must be placed on the projecting points.

2. Spiral of the Abdomen.—*Application.*—Commence at the lower part of the chest, and carry the roller obliquely around the abdomen, making one or more turns around the thighs to prevent it from slipping upward.

Use.—To produce pressure, as in certain cases of tympanitis, or after the operation of tapping in ascites. If very firm pressure be desired, the double-T bandage may be used.

3. Spiral of the Upper Extremity.—A roller for this extremity should be eight yards long by two or two and a half inches wide.

Application.—Having covered the fingers by the gauntlet (Fig. 32), if it be necessary, give one or two circular turns around

Fig. 31.



the wrist to secure the end of the bandage; then pass the roller obliquely over the back and palm of the hand to the extremity of the fingers, and then ascend to the metacarpo-phalangeal joint of the thumb by three spiral turns without the reverse (Fig. 33); cover this and the wrist-joint by a figure-of-8 (to be described), and ascend the limb by reversed turns till the elbow is reached. Cover the elbow-joint with the figure-of-8, if it is to be flexed, otherwise use the simple spiral turns with the reverse, continuing the bandage to the shoulder. Compresses to be used when required.

Care must be exercised not to apply too much traction, lest gangrene or ulceration ensue as a consequence. The only difficulty experienced in the application of this bandage is in making the figure-of-8 neatly at the elbow.

Use.—It is employed in the treatment of varicose veins, aneurisms, fractures, etc.

4. Spiral of the Finger.—This is usually known as the *finger bandage*, and should ordinarily be about one yard in length by one inch in width.

Application.—Fasten the initial end of the roller at the wrist by circular turns; then cross the back of the hand, descending to the end of the affected finger by very oblique turns. Commencing at this extremity, ascend the finger by making the spiral with reverses, terminating the bandage by a circular sweep at the point of starting.

Use.—To retain dressings.

5. Spiral of all the Fingers, or Gauntlet.—The gauntlet requires a roller eight yards long by one inch wide.

Application.—Commence at the wrist by making one or more circular turns, then cross the back of the hand, descending to the end of the index finger by oblique turns; now ascend to the base of the finger by spirals with the reverse; then pass to the middle finger, and descend it by oblique turns; when at the extremity, return by making the spiral turns as before, and so on till all the fingers are covered, terminating the roller at the wrist, where it may be fastened with a pin. (Fig. 32.)

Use.—This bandage is applicable when two or more fingers are injured, or when there is danger of their becoming united if allowed to remain in contact, as in cases of burns; also, in fractures and dislocations.

Fig. 32.



6. Spiral of the Penis.—*Application.*—Commencing at the glans penis, form the spiral with reverses, terminating at the root of the organ, where the terminal end of the roller may be fastened by slitting it into two parts, which tie in a bow-knot. (Fig. 33.)

Fig. 33.



Use.—It is employed in retaining dressings, as in cases of chancres and other sores external to the prepuce; also, to compress the urethra when necessary, a catheter being left in it.

7. Spiral of the Palm, or Demi-Gauntlet.—*Application.*—Confine the initial end of the roller by circular turns round the wrist, passing from its ulnar to its radial side; then carry the roller obliquely across the back of the hand (or the palm, according to which side the dressing is to be retained); thence to the radial margin of the forefinger; encircle its base, and continue

the roller around the wrist; pass in like manner, by oblique turns, around the base of each finger, including the thumb, terminating the bandage at the point of starting. (Fig 34.)

The above is similar to the directions given in surgical works for the application of this bandage; but the figure used by way of illustration, Fig. 34, does not correspond, as a critical inspection will plainly show. In order that the figure may constitute a

Fig. 34.



correct guide, it should be studied in connection with the following directions, which are equally as simple as those already given, and may be adopted if preferred: Having the hand prone, fix the initial end of the roller by circular turns, commencing at the top of the wrist (its radial side); upon reaching the ulnar side the second time, carry the roller under the wrist to the carpo-metacarpal joint of the thumb; encircle its base, pass obliquely across the back of the hand; thence around the ulnar margin of the wrist, passing to the carpal extremity of the radius; from which continue onward to the cubital side of the base of the little finger, encircle it, and pass again to the ulnar margin of the wrist, thence to its radial side; from which point continue obliquely across the back of the hand, to pass around the root of the third finger; and so on with the two remaining fingers, terminating the bandage by a circular sweep at the wrist.

8. Spiral of the Lower Extremity.—This bandage is composed of two rollers, each seven and a half yards long by two and a half inches wide.

Application.—The patient may be seated with his heel resting on the point of the surgeon's knee, or he may assume a horizontal position, having his limb supported by assistants. The surgeon, placing himself on the outside of the limb, if he be standing, should commence by one or more circular turns from without inward, immediately above the malleoli. Then descend from the

external malleolus obliquely across the instep, and under the sole of the foot to the extremity of the little toe; from this point cover in the foot to the instep, by spiral reversed turns, which are to be continued up the leg to the knee, when the figure-of-8 should be employed. With a second roller the remainder of the limb may be covered. (Fig. 35.)

Use.—It is employed in the treatment of fractures, ulcers, varicose veins, and œdema.

The only objection which can be raised to this mode of applying the bandage is, that it leaves the heel uncovered; and, where there is firm pressure, — as in the treating of varices, ulcers, etc., — this part is disposed to swell and become painful

Fig. 36.



if left unprotected; hence, in particular cases it is advisable to cover it, which may be accomplished as follows: Confine the initial end of the roller, covering the foot to the instep, as before directed; from the top of the instep pass directly over the point of the heel to the side of the ankle; thence around the front of the instep and the sole of the heel, covering in the anterior half of the previous turn; continue on to the outer malleolus; and thence in front of the joint again to the sole and point of the heel, thus forming around the leg, instep, and sole, a figure-of-8. (Fig. 36.)

9. French Spiral.—*Application.*—Place the initial end of the roller upon the outer side of the instep, and pass obliquely across the upper surface of the foot to the ball of the great toe;

Fig. 35.



thence beneath the sole to the opposite side; then proceed with as many spiral reversed turns as will be necessary to carry the bandage well up in front of the instep, when a few circular sweeps are to be passed around the malleoli and immediately above; after which, ascend the limb by the spiral reverses. (Fig. 37.)

Fig. 37.



Use.—This form of bandage has the same general use as the one just described, and represented in Fig. 36. As it leaves the heel and toes well exposed, it is, on this account, principally employed in the application of the *Dextrine* or *Starch Bandage*.

IV.—The Crossed or Figure-of-8 Bandage.

This is one of the neatest and most useful bandages employed by the surgeon, deriving its name from its shape. It is particularly applicable in covering joints or other parts requiring a firm and perfectly uniform pressure. Either the single or double headed roller may be used. It is divided into several kinds, including the *Spica*, each of which will be treated of under its appropriate heading.

1. The Crossed of One Eye.—This bandage requires a roller five yards long by two inches in width.

Application.—If the hair be long or very abundant, place a closely-fitting cap of muslin, or of a similar material, on the head previous to the application of the bandage, to prevent the roller from slipping. If for the right eye, pass from right to left around the forehead and nape of the neck by circular turns; provided it be for the left eye, pass in the opposite direction. On reaching the nape of the neck the third time, carry the roller under the ear of the affected side, and obliquely over the jaw and eye, covering the root of the nose, without carrying the band low enough to interfere with the vision of the sound eye; thence

across the temple to the occiput, making the necessary number of similar turns to fulfill the object of the bandage, terminating it by circular sweeps around the forehead. (Fig. 38.)

Fig. 38.



Fig 39.



Use.—Simply to retain dressings; or, if desirable, to make pressure.

2. The Crossed of Both Eyes.—This bandage may be made with a double or single headed roller, seven yards long by two inches wide.

Application.—Make two or three circular turns around the forehead and occiput by passing from right to left, or *vice versa*; on reaching the back of the head, pass under the ear up over the eye, root of the nose, and the parietal protuberance, to the neck again; at the third turn, pass from the parietal protuberance to the temple, instead of round the occiput; then cross the root of the nose, the eye and the cheek, making a **X** with the turns first made; continue with a sufficient number of similar turns, terminating by circular ones.

Use.—It is employed as a retaining bandage. Pressure can be secured by a much more simple bandage, which consists of compresses and a broad piece of linen passed around the eyes, reaching to the middle of the forehead above, and terminating below just above the margin of the upper lip, and having an opening large enough to admit the nose. (Fig. 39.)

3. The Crossed of the Angle of the Jaw.—This requires a roller five yards long by two inches wide, and a compress.

Application.—Secure the end of the bandage by circular turns around the cranium, passing from right to left, if the left side be affected; the reverse, if the injury or disease be upon the right. From the occiput pass the roller under and behind the ear of the sound side; under the jaw to the angle of the jaw on the affected side, placing a compress on and immediately behind this angle. Now carry the roller over the compress and the side of the face in front of the ear, obliquely over the vertex, behind the ear opposite the affected side. Make several turns in like manner, reversing the last in order to terminate the bandage by passing horizontally around the head.

Fig. 40.



Fig. 41.



Use.—It is sometimes employed to retain dressings in the parotid region; but its principal use is in the treatment of fracture of the neck and angle of the jaw, being the most efficient bandage used in cases of this character, as it forces the angle forward and inward to the anterior fragment by counteracting the action of the pterygoid muscles. In the application of this bandage in the treatment of fracture, omit the circular turns, sometimes recommended around the neck and chin; as they are of no benefit, but rather tend to displace the fragments.

4. Harton's Bandage for the Jaw.—A roller five yards long by two inches wide is required.

Application.—Place the initial extremity of the roller on the occiput immediately below its protuberance, and carry the cylinder obliquely over the center of the parietal bone to the top of the head; thence descend across the right temple and zygomatic arch, passing beneath the chin to the zygoma of the left side; from this point proceed to the occiput again by traversing obliquely the zygoma, the temple, the summit of the cranium, and the right parietal bone. Now conduct the roller to the left, winding around the base of the jaw, to return to the occiput; repeat this same course until the roller is spent, placing a pin at the vertex, and at other points where the bandage crosses itself, as represented in Figs. 41 and 43.

Fig. 42.



Fig. 43.



Use.—It is employed in the treatment of fractures of the lower jaw, anterior to the angle. This is eminently the most simple, easily applied, and useful bandage that has been invented for this purpose.

5. Professor Gibson's Bandage.—Though not exactly a figure-of-8, this bandage is similar to the above, and may be described here. It consists of a roller five yards long by an inch and a half or two inches wide, with suitable compresses.

Application.—A piece of pasteboard having previously been softened by immersion in hot water, and molded to the form of the chin and jaw, as seen in Fig. 42, is first applied upon the seat of fracture. The middle portion of the bandage being placed upon the chin over the splint, then, placing a linen compress of

suitable thickness under the chin, confine it by passing the roller several times perpendicularly over the side of the face, the zygoma, and the summit of the head, and thence beneath the jaw; changing the course of the bandage at the temple, encircle the occiput and forehead by horizontal turns; a few horizontal turns are also to extend around the nape of the neck, along the ramus of the jaw, over the point of the chin. To render the whole more secure, a short strip may be fastened to the horizontal turns, encircling the forehead, extending to the lower horizontal turns. (Fig. 42.)

Use.—Fractures of the inferior maxilla.

6. The Posterior Figure-of-8 of the Chest.—This requires a roller seven yards long by three inches wide.

Application.—Having the anterior edge of the axillæ well protected by compresses of cotton, in order to prevent them from becoming chafed, direct an assistant to draw the patient's shoulders well back, and commence the initial end of the roller at the superior part of the left arm, by making three or four spiral reversed turns from before backward, and from within outward.

Fig. 44.



From the front of this shoulder, pass obliquely over the back of the right axilla; thence in front of the shoulder over the back to

the axilla of the left side again; continue to make similar turns so long as the roller will permit, fastening its terminal end by one or two circular sweeps around the body or arm. (Fig. 44.)

Use.—Formerly it was the principal bandage used in the treatment of fractured clavicle; but more modern ingenuity has devised means better adapted to the treating of this injury, and hence it is little employed for this purpose at present. It may be of service in uniting wounds of the back, or in preventing contractions from burns, or other causes, on the front of the chest.

7. The Anterior Figure-of-8 of the Chest.—For this bandage a roller of the same dimensions as the above is required.

Application.—This bandage is applied the same as the one just described, with the exception of the turns crossing each other on the breast instead of the back.

Use.—To unite longitudinal wounds of the breast, in dislocation, anteriorly, of the sternal end of the clavicle, when compresses should be placed on the upper part of the sternum; and in severe burns on the back, when deformity is threatened by the contraction of the cicatrices.

8. Spica of the Shoulder.—This should be eight yards long by two and a half inches wide.

Application.—Leaving about two feet of the initial end of the roller free, commence by making one or more spiral reversed turns around the superior part of the arm of the injured side, passing from without inward, and from before backward. Then pass behind the arm over the shoulder, obliquely downward across the front of the chest to the axilla of the sound side; thence around the back, obliquely upward over the shoulder and down in front, passing under the axilla of the affected side. Continue to make similar turns, covering one-third of each preceding one. The axilla must be well supplied with suitable compresses or cotton. After securing the terminal end of the bandage, bring the initial portion, which was left free, over the anterior folds of the axilla and the shoulder around the back of the neck, to terminate in front of the chest on the sound side. (Fig. 45.) When this bandage is made to ascend from the point of the shoulder toward the neck, it is called the *Spica Ascendens*; if from the neck to the shoulder, *Spica Descendens*.

Fig. 45.



Use.—To make compression around the extremity of the shoulder, and in the treatment of dislocation of the humeral end of the clavicle.

Fig. 46.



9. Figure-of-8 of the Neck and Axilla.—The roller should be five yards in length by two inches wide.

Application.—Directing the roller from before backward, and from left to right, secure the end by one or two circular turns around the neck; reaching the base of the left side, pass over and behind the shoulder, under the axilla; thence in front to the root of the neck on the same side; round the neck to the left side again, to make the subsequent turns in like manner. (Fig. 46.)

Use.—This is a very serviceable bandage in retaining dressings about the shoulder, or in the axilla. It must, however, be applied with care, that it may not press too firmly, thus interrupting circulation or causing cramps in the hand.

10. Figure-of-8 of One Breast.—This requires a roller eight yards long by two and a half inches wide.

Application.—It may be applied by confining the initial extremity of the roller at the waist; reaching the left side of the body, or the right, as the case may be; direct the roller obliquely across the front of the chest, over the shoulder of the sound side; thence obliquely downward across the back, to make a horizontal sweep around the waist, as represented in Fig. 47. Continue with similar turns until the bandage is exhausted. It is preferable, however, to apply it as follows: Place the initial end of the roller behind the shoulder of the affected side; pass obliquely across the back, over the root of the neck on the opposite side; thence obliquely downward in front of the chest, passing beneath the injured breast and under the axilla, to the point of starting. Make similar turns to fasten the roller; then, on reaching the axilla of the side affected the third time, proceed with a horizon-

Fig. 47.



tal sweep around the trunk, to the place of starting; thence over the shoulder again, and so on till the bandage is complete.

Use.—It is employed as a retaining bandage, and to afford support to the mamma in case of cancer or injury.

11. Figure-of-8 of Both Breasts.—A roller from twelve to fifteen yards in length by two and a half inches in width is required.

If the object be to approximate the shoulders to the sternum alone, the folds of the bandage should cross in front of the chest and above the mammae; but if it be to give support to the gravid breasts previous to or during the period of lactation, the roller should be applied as follows:

Application.—Place the initial extremity of the roller behind the right axilla; from which point continue across the back;

Fig. 48



carry the cylinder over the left shoulder, and pass obliquely beneath the right mamma, to the place of starting. Gradually ascend by two or three succeeding turns, made in like manner, and then pass transversely across the back to the left axilla; thence across the chest, under the left mamma, to the right side of the neck, and thence to the left axilla again. Make two or more similar turns, and on reaching the axilla continue horizontally around the trunk, allowing the sweeps of the roller to cover the breasts from below upward. Terminate the bandage by an additional turn around the neck and axillæ. (Fig. 48.)

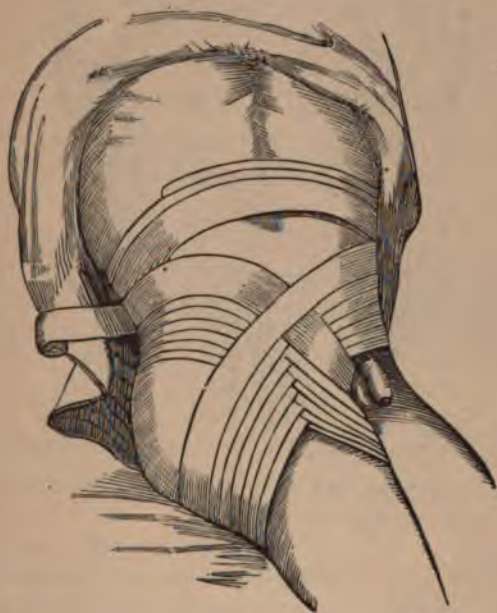
Use.—This bandage may also be employed to retain dressings, but is particularly useful in giving support to pendulous mammae during the period of lactation.

12. Spica of the Groin.—This bandage requires a roller eight or ten yards long by three inches wide.

Application.—Confine the initial end of the roller above the iliac crest by making two or three horizontal turns around the trunk. Then pass from right to left if for the right groin, and from left to right if for the left. From the iliac crest descend to the

inner side of the thigh, as far down as the bandage is to extend; next, carry the cylinder completely around the thigh, to cross the first turn very nearly in front; thence to the opposite side, passing transversely across the back, to continue with the necessary number of similar turns. Terminate the roller by a circular sweep. Thus applied, the bandage constitutes a *Spica Ascendens*. (Fig. 49.) If the *Spica Descendens* be desired, it is readily made by passing the first turn high in the groin instead of the last one.

Fig. 49.



Use.—To retain dressings, and to make compression. Is useful after operations for strangulated hernia, where compression is required.

13. Spica of Both Groins.—It is formed of a roller twelve yards long by two and a half inches wide.

Application.—After securing the initial end of the roller as previously directed, by passing from right to left and from before backward, conduct the cylinder obliquely downward from the right iliac crest to the outer side of the left thigh; which being encircled, pass around the back of the pelvis to the right groin, from

which point descend to the inner side of the corresponding thigh; carry the roller completely around it, and thence obliquely upward across the pelvis to the left side; passing transversely along the back to the right ilium, pursue a similar course, terminating the bandage by a circular turn. (Fig. 50.)

Fig. 50.



Use.—To make compression, and to retain dressings.

14. Figure-of-8 of the Elbow.—The roller should be two yards long by two inches wide.

Fig. 51.



Application.—Confine the free extremity of the roller at the upper part of the fore-arm; on reaching its radial side, conduct the head of the roller obliquely across the bend of the elbow to the internal condyle of the humerus; thence above the olecranon to the external condyle; from this point form an X in front of the joint by crossing the first turn obliquely, and pass around the fore-arm to continue the course just described. (Fig. 51.)

If the arm be much flexed, make one circular sweep around the point of the elbow after completing the second Figure-of-8.

Use.—Is employed to cover the elbow-joint, and is therefore used in connection with the Spiral of the Upper Extremity, as the joint cannot be neatly covered with the simple reversed turns.

15. Figure-of-8 of the Wrist.—*Application.*—Secure the end of the roller by circular turns around the wrist; on reaching the ulnar margin the second time, pass obliquely across the hand to the space between the thumb and forefinger; thence transversely to the metacarpal bone of the little finger; from this point pass to the radial side of the wrist, and thence to the ulnar margin, to continue the same course.

Use.—To compress or retain dressings to the wrist-joint. It is sometimes added to complete the Spiral of the Upper Extremity.

16. Spica of the Thumb.—This bandage comprises a roller three yards long by about one inch wide.

Application.—Fix the end of the roller as above; then from the radial side of the wrist pass around the base of the thumb to again encircle the wrist from the radial to the ulnar margin, the hand being prone, or nearly so.

(Fig. 52.) Make the subsequent turns in like manner.

Use.—To make pressure on the base of the thumb, and is very effective in keeping the phalanx of the thumb in position after dislocation.

Fig. 52.



17. Figure-of-8 of Both Thighs.—*Application.*—A few turns of the roller, which should be about two and a half inches wide, in the simple Figure-of-8, is all that is required to make a proper application of this bandage.

Use.—To prevent movement of the thighs, as after the operation of lithotomy, or after the reduction of a luxation of the femur.

18. Figure-of-8 of the Knee.—*Application.*—Secure the free end of the roller by circular turns around the superior part of the leg; on reaching the head of the fibula, pass obliquely over the patella to the internal condyle; thence transversely to the external one; from this point, cross the patella obliquely down-

ward, forming a **X** with the first turn. Continue in a similar course till the knee is completely covered.

Use.—To afford pressure on the joint. It can also be employed to retain dressings in the popliteal space, or in treating fracture of the patella, or hydrops articuli, by reversing the turns of the bandage, by which the roller is made to pass from within outward, and from the extremity of the fibula across the back of the knee to the internal condyle; thence to the opposite side, onward to the head of the tibia, to regain the place of starting.

19. Spica of the Instep.—Requires a roller seven yards long by two inches wide.

Application.—Start the roller from the tarsal extremity of the metatarsal bone of the little toe of the right foot; pass obliquely across the top of the foot to the base of the first phalanx of the great toe; thence transversely beneath the sole to the first joint of the little toe; now make two spiral turns over the front of the



foot to reach the instep; from which conduct the cylinder over the point of the heel, permitting the roller to project a little beneath the sole; keeping parallel to the latter, cross the instep with turns which shall embrace the heel, forming the Spica as high as desired. (Fig. 53.) If for the left foot,

commence by placing the initial end of the roller on the tarsal extremity of the metatarsal bone of the great toe; thence pass obliquely across the front of the foot to the base of the little toe, and continue with turns similar to those just described, terminating the bandage by circular turns above the ankle.

Use.—This is a very serviceable bandage in making firm pressure of the instep or ankle, as is sometimes required in wounds of the tibial arteries occurring at this point; also, in cases of sprain of the ankle, etc. We are indebted to the ingenuity of M. Rabbail for this bandage, who was the first to describe and recommend it.

V.—Recurrent Bandages.

Recurrent bandages are applied by peculiar turns, which make a sort of a cap for the parts they are designed to cover. Being

easily deranged, and difficult to make compression with on the vault of the cranium, oppressive to the forehead and temples, by the many circular turns, they are little used at the present day, and are, in consequence, almost entirely superseded by more approved dressings. A double or single headed roller may be employed in their application, though the latter is preferable.

1. Recurrent of the Head.—This bandage is composed of a single-headed roller, five yards long by two inches wide.

Application.—Make two or three horizontal turns around the lower part of the forehead and occiput, in order to fix the free end of the roller. On reaching the middle of the forehead, make a reverse at right angles with the circular turns, directing the head of the roller over the summit of the cranium to the occipital protuberance. A similar reverse must be made at this point, in order to reach the forehead again. Continue in like manner with the subsequent turns, allowing each one to cover in one-third of the preceding. The opposite side can be covered by similar turns, if desired. (Fig. 54.)

Use.—To retain dressings to the head. If this bandage be used, great care must be exercised lest serious results follow, such as ulceration or gangrene, in consequence of the turns being drawn too tight.

2. Recurrent of the Head.—*Application.*—Fig. 55 represents the bandage as applied in the use of the double-headed roller. Placing the body of the band on the forehead, *a*, make two or three circular turns; then reflect one head of the roller, *b*, over the vertex, while the other is continued transversely around the head, to hold it in position. Covering one side of the cranium by

Fig. 54.



Fig. 55.



passing one head of the bandage backward and then forward, the other side may be dressed in like manner.

Use.—Same as the former.

Fig. 56.



3. Recurrent of Amputations.—*Application.*—Having the stump well supported, and the integuments pushed over the end of the bone, proceed to arrange the dressings properly; after which, place the initial end of the roller on the limb three or four inches above the extremity of the stump, and secure it by two or three circular turns; on reaching the middle of the under portion of the limb, reverse the roller, in order to conduct it over the end of the stump to the upper surface, A, about four inches above the extremity. (Fig. 56.) Hold the reverses with the fingers of the left hand till the entire face of the stump is covered: then secure them by spiral reverse turns, commencing at B, and continue two or three inches above the part of the bandage first applied. Care must be taken not to apply any portion of the bandage too tight, for fear of producing irritation and spasms.

(The application of a suspensory bandage to the testicles is also shown in the cut.)

Use.—To retain dressings, and to afford protection to the stump.

SECTION III.

The Compound Bandage.

Compound bandages consist of two or more bands, united so as to form a somewhat complicated means of retaining dressings.

Their construction is sometimes quite as difficult as their application; hence, pains should be taken to have them properly arranged, that they may adapt themselves perfectly to the part they are intended to cover.

The varieties of this form of bandage include the *T* and the *Invaginated Bandages*, as well as *Slings*, *Suspensories*, *Sheaths*, and *Laced Bandages*; receiving their names either from their peculiar form, use, part to be covered, or manner of application.

I.—The T-Bandage.

1. Single T or Crucial Bandage.—*Composition.*—It consists of two pieces—one horizontal, the other perpendicular—united in the form of a T. (Fig. 57.) The vertical piece should be about one-half the length of the horizontal portion, and fastened firmly to its middle. Sometimes two vertical pieces are used instead of one, forming the Double-T; or, what is very nearly the same thing, the single tail is slit into two parts to within a short distance of the transverse band. (Fig. 58.) The special application and use of this bandage will be described in the consideration of its several kinds.

Fig. 57.



Fig. 58.



2. T-Bandage of the Head.—*Composition.*—Employ a horizontal portion two yards long by two inches wide; upon which, at a point about two feet from one extremity, stitch a vertical strip at right angles, the latter being one-half yard long by two inches in length.

Application.—Having the bandage rolled into two heads, place it upon the forehead so that the vertical portion may pass over the summit of the cranium to hang down the neck; after making one revolution around the forehead and occiput to secure the vertical strip, then reflect the latter over the vertex to the forehead, and continue the horizontal turns until the bandage is exhausted. (Fig. 59.)

Fig. 59.



Use.—This is used as a light retaining bandage, as the vertical portion can be made to pass over the cranium in any other direction. It is preferable to the recurrent bandage.

3. T-Bandage of the Ear.—*Composition.*—A horizontal portion two yards long, a vertical band one-half yard long, and a piece of linen to cover the ear; or, if the dressing is to be applied either behind or in front of the ear, use a piece with a slit in it sufficiently large to permit the ear to pass through. (Fig. 60.) Sew one end of the piece of linen to the middle of the horizontal

Fig. 60.



Fig. 61.



band, and to the other end attach the superior extremity of the vertical band.

Application.—Place the circular band on the head above the ear of the affected side, and pass the linen over the part to be covered, continuing the vertical portion under the jaw and up

covered, continuing the vertical portion under the jaw and up on the opposite side, where it will be confined by the horizontal sweeps of the transverse band. (Fig. 61.) This, the most simple bandage applied to the ear, is, nevertheless, but little employed; temporary bandages, or, what is better, a simple cravat, fastened on the top of the head, having been substituted for it.

Use.—To retain dressings on or in the vicinity of the ear.

4. Double-T of the Nose.—*Composition.*—One band two yards long by one inch wide, and two bands one yard long by the same width; the latter to be fastened to the first at right angles, being one inch apart.

Application.—Placing the middle of the horizontal band on the upper lip, conduct the extremities transversely across the cheeks, under the ears, to the nape of the neck, where they are to be tied in a bow-knot. Then cross the vertical bands at the root of the nose, conduct them obliquely over the summit of the head to the occiput; insert them under the roller first applied, continue their course around the head, passing immediately behind the ears, and confine their extremities by additional turns of the horizontal band, fastening them securely with pins. (Fig. 62.)

Use.—A retaining bandage for the upper lip and root of the nose, particularly in cases of fracture of the latter.

5. Double-T of the Chest.—*Composition.*—A broad piece of muslin suited to size of patient, and a band of about two feet in length, split into two tails and fastened to the upper edge of the horizontal piece.

Application.—Pass the muslin around the chest, and make it firm by stitches, or by pins carefully applied. Then pass the bands over the shoulders to fasten them in front. (Fig. 63.)

Fig. 62.



Fig. 63.



Use.—To effect compression in fracture of the ribs, or to retain dressings on the back.

6. Double-T of the Abdomen.—*Composition.*—Consists of a wide piece of muslin, to the lower border of which are attached two narrow bands, half a yard long, and which should be sufficiently wide apart to very nearly correspond with the great trochanters.

Application.—Encircling the abdomen and pelvis by a turn of the muslin, conduct the bands obliquely beneath the perinæum, under which they are to cross each other, and fasten near the crest of the ilium, as represented in Fig. 64.

Use.—To retain dressings, and to make compression after the operation of paracentesis, or after delivery.

Fig. 64



7. Triangular, or Compound T of the Groin.—*Composition.*—A triangular piece of muslin five inches wide at the base and ten inches long; to the base is sewed a band two yards in length, and to the apex another, three-quarters of a yard long.

Application.—Place the triangle on the groin with its apex pointing downward; pass the superior band around the waist,

tying it in front. Now carry the triangular portion and the vertical band down between the thigh and scrotum, nearer the latter than is represented in the accompanying cut; continuing the band over the outside of the thigh, to be attached to the transverse portion. If, however, the patient be able to move about, the vertical band may be made two yards in length, and caused to pass from the outer aspect of the thigh obliquely across the front of the pelvis, behind the back, to terminate by a turn around the thigh at the apex of the bandage. (Fig. 65.)

Fig. 65.



Use.—To retain dressings upon the groin in the treatment of buboes, or after operating for hernia; and for this purpose it is the most convenient and serviceable bandage used.

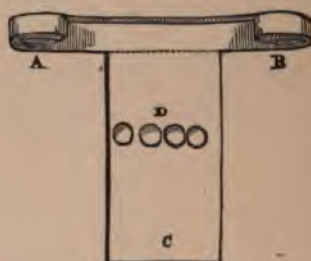
8. Double-T Bandage of the Buttock.—*Composition.*—A roller two yards long and three inches wide, and two vertical bands, each three-quarters of a yard long and two inches in width, stitched to the former at the proper distance apart and at about one-quarter its length from one extremity. (Fig. 66.)

Application.—Place the horizontal band on the back of the pelvis, so that the vertical strips may be conveniently and smoothly carried under the perinaeum, to fasten to the horizontal band in front.

Fig. 66.



Fig. 67.



Use.—Employed to retain dressings for the perinaeum, anus, or vagina, in cases of piles, prolapsus ani, and fistula.

9. Perforated T-Bandage of the Hand.—*Composition.*—A roller one yard long by two inches broad, and a piece of muslin twice the length and once the breadth of the hand. Fold the muslin on itself lengthwise, and cut four circular openings, D, in it, to correspond with the fingers. Then sew one of its extremities at right angles to the roller, A B, Fig. 67.

Application.—Pass the fingers through the openings, and draw the end of the muslin, C, over the back or palm of the hand, fastening the free end by circular turns of the roller.

Use.—This bandage and the one next to be described afford most excellent substitutes for the gauntlet or demi-gauntlet. It is very easily applied, and forms a light retaining bandage for dressings applied either to the back or palm of the hand, or to the interdigital spaces.

10. T-Bandage of the Hand.—*Composition.*—Two strips of bandage, each a yard long by one inch wide, one of which is sewed to the other in the form of a T.

Application.—Place the horizontal portion of the bandage on the back or front of the wrist, according to which side of the hand the dressing is to be retained; carry the vertical roller over the interdigital space of the first and middle finger, to reach the wrist again, where it is secured by a revolution of the transverse

band; reflect the vertical piece over the second interdigital space, and so on till the bandage be complete.

Use.—To retain dressings to the hand, and may be used in preference to the gauntlet or demi-gauntlet.

II. — The Invaginated Bandage.

The Invaginated Bandages are of two kinds, according as they are prepared from one or two rollers. In one instance, the roller is torn into strips or tails at one extremity, while there are slits or button-holes made near the other, through which the tails are designed to pass; in the other instance, two separate bands are employed. By their action as compresses they are very efficient in neatly approximating wounded surfaces. The first, or that made with one roller, is more applicable to the treatment of longitudinal wounds; whereas, the second is employed in those which are transverse, and also in certain forms of fracture. In general, this kind of bandage will be found particularly useful in deep-seated wounds, especially in cases where the parts below cannot readily be kept in apposition, thus favoring the formation of pus.

1. Invaginated Bandage for Vertical Wounds of the Lip.

— *Composition.*—A roller from two to three yards long by one inch wide, rolled into two heads, and two compresses two inches square, which are placed on the cheeks near the angle of the mouth.

Application.—Place the body of the roller on the forehead; conduct the cylinders around the head to the occiput; from which pass immediately below the ears, over the compresses, to the injured lip, where one roller is made to pass through an opening in the other, when both are continued round the head again. Continue this course until the parts are properly supported, terminating the bandage on the forehead. (Fig. 68.)

Fig. 68.



Use.—In vertical wounds of the lip, to support harelip suture; and may be used in hemorrhage of the coronary arteries.

2. Invaginated Bandage of the Body.—*Composition.*—A double-headed roller long enough to encircle the body several times, and two compresses the length of the wound.

Application.—Place the body of the bandage on the back, carrying the heads under the axillæ, over the compresses and wound; one band being made to pass through a slit in the other. Draw the rollers sufficiently tight to coaptate the sides of the wound properly, and continue as many revolutions around the body as required.

Use.—In longitudinal wounds of the chest or abdomen.

3. Invaginated Bandage for Longitudinal Wounds of the Extremities.—*Composition.*—A piece of linen sufficiently long to make several turns around the part, and as wide as the wound is long; tear one extremity into three tails, of a length to embrace three-fourths of the limb. After making three openings, through which the tails are made to pass, roll up the remaining portion of the band in order to apply it more conveniently. Two graduated compresses are also required.

Application.—If the limb be tapering at the part to be dressed, a few turns of a spiral bandage must be first applied at the lower portion to prevent the second bandages and compresses from slipping. Then apply that part of the bandage situated between the tails and slits on the limb directly opposite the wound, with the graduated compresses on either side of the latter; pass the tails through the corresponding openings, and make sufficient traction to coaptate the lips of the wound. Secure the tails by turns of the remaining portion of the roller. (Fig. 69.)

Fig. 69



Use.—In deep-seated wounds of the extremities. Adhesive strips may also be used at the same time.

4. Invaginated Bandages for Transverse Wounds of the Extremities.—*Composition.*—An ordinary roller, together with two strips of muslin corresponding in width with the length of the wound, and having three tails in the extremity of one, and three slits near the middle of the other.

Application.—Place the piece having the slits in it upon the limb immediately below the wound, so that the openings will correspond with its lower lip; fasten the inferior extremity of this piece by circular turns of the roller; now fasten the piece with the tails above the upper edge of the wound in a similar manner; place a compress above and below; then draw the tails through the openings with sufficient traction to approximate neatly the edges of the wound. (Fig. 70.)

FIG. 70.



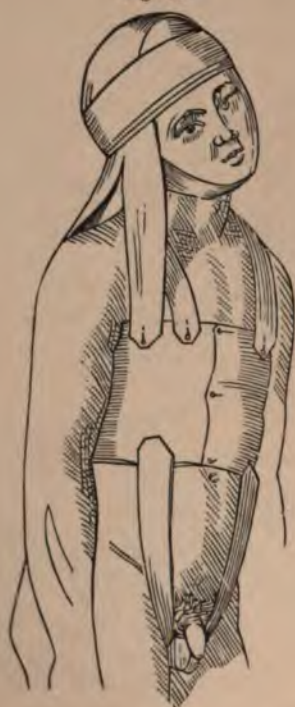
Use.—Transverse wounds of the extremities, and fracture of the patella.

5. Uniting Bandage for Transverse Wounds of the Neck.—*Composition.*—A single-headed roller four yards long by two and a half inches wide; a piece of muslin one and a half yards long by three inches wide; a bandage for the chest with perineal bands and shoulder strips.

Application.—Fasten the bandage about the chest; then pass the muslin over the summit of the head, and secure it by circular turns of the roller; pin the free extremities of the muslin to the bandage encircling the thorax, previously inclining the head so as to meet the requirements of the case. Complete the dressing

by applying the perineal and shoulder bands. (Fig. 71.) (In the cut the muslin is represented as being attached to a closely-fitting cap, which is fastened to the head by a band passing under the chin.)

Fig. 71.



Use.—In transverse wounds of the neck, as of those occasioned by attempts at suicide, and in severe burns, to prevent deformity by the contraction of the cicatrices.

III.—The Sling.

Slings are formed of pieces of muslin of different lengths and widths, according to the circumstances of the case; and are split into strips at each extremity. (Fig. 72.) They are some-

times made, also, by attaching bands to the muslin, the latter remaining whole,—thus giving it a resemblance to slings employed for hurling stones; whence their name.



1. Six-tailed Sling, or the Head Bandage of Galen.—*Composition.*—A piece of muslin one yard long by a quarter of a yard wide, split into three tails at each extremity to within about three inches of the middle, the central part being the widest.

Fig. 73.



Application.—Place the body of the sling on the top of the head, carrying the central tails underneath the chin. Direct the anterior strips to the posterior part of the head, and secure them by bringing the two remaining tails forward to the forehead, where they may be fastened with pins.

Use.—To retain dressings.

2. Four-tailed Sling of the Head.—*Composition.*—A band of muslin a yard long by six inches broad, torn at each extremity into two tails extending to within three inches of the middle.

Application.—When it is to be applied to the forehead, place the body of the sling on the wound, and carry the frontal tails to the occiput, where they are to be fastened; then pass the posterior tails under the chin. (Fig. 74.) If it be required to confine dressings to the summit of the head, the posterior tails should be made to pass under the chin, and the anterior crossed on the occiput, and then brought forward to fasten in front of the throat.

In applying it to the *nape of the neck*, the upper tails are to be carried over the forehead, crossed and fastened at the occiput. Pass the lower tails in front of the neck. (Fig. 75.)

Fig. 74.



Fig. 75.



Use.—In wounds of the head and neck, as they can be readily applied to any portion of these parts by changing the direction of the tails.

3. Sling of the Chin.—*Composition.*—A piece of muslin six inches by four, slit into two tails at each extremity, the tails being two inches long, and having a piece of tape or narrow band one yard long attached to the end of each one.

Fig. 76.



Application.—Place the body of the sling so that the chin may rest directly in the center; then carry the upper tails backward beneath the ears to the nape of the neck, where they should cross; thence to the forehead, fastening them by the use of pins, or by a knot. The two posterior or under tails are then to be carried upward in front of the ears to cross at the vertex, each being continued onward in the same line until it reaches the point of crossing of the upper and lower tails, where it should be secured by a pin. The cut, Fig. 76, represents it as terminating a little above.

Use.—In fracture of the inferior

maxilla without displacement, and to retain dressings to the chin or lower part of the jaw in case of other injuries.

4. Sling of the Face, or Mask.—*Composition.*—A piece of muslin or silk about ten inches square, and four bands with which to hold it in position. In preparing the piece for the face, fold it upon itself through the middle; now place this folded edge so that it will exactly correspond with the mesial line of the face,

Fig. 77.

and draw the line A B, and a circular line, C, to indicate the openings for the eyes. (Fig. 77.) Draw a semi-circular, F, for the mouth; also a small transverse line, E, to correspond with the end of the nose. Then cut off the angles A H and I K, to give an oval form, and cut out a triangular piece at G from each of the free edges; the lips



of the opening thus made, to be sewed together, so that it may be adapted to the prominence of the cheek bones. Attach two vertical tails at I, and two horizontal ones at A; now open it, and make a vertical incision, D, from the line E, up to the point between the eyes, to admit the nose.

Application.—Applying the body-piece to the face, carry the tails attached at A around the side of the head to the occiput, cross them, and pass to the forehead. The horizontal tails are to be passed backward, and crossed on the nape of the neck, and thence to the forehead or chin.

Use.—To retain dressings to the face in cases of burns, wounds, small-pox, etc.

5. Sling of the Mamma.—*Composition.*—A square piece of muslin sufficiently large to cover in the breast, having on each side an incision one inch and a half deep; and having, also, four bands long enough to reach around the chest, sewed to its angles.

Application.—Having the mamma supported, place the body of the sling on the part, and direct the lower tails under the axillæ. Conduct the upper tails over the shoulders down to the horizontal band, where they are to be fastened. (Fig. 78.)

Fig. 78.



Use.—To retain dressings to the breast, or to afford support in cases of cancer, etc. It may sometimes be used in preference to the Four-tailed Sling in confining dressings to the point of the shoulder, the elbow, wrist, heel, or instep, it being necessary only in the application to pass the tails around the part in such a manner as to secure the bandage firmly.

IV.—The Suspensory.

Suspensories are bags of various sizes, employed to support depending parts, and to retain dressings to parts upon which it is not convenient to apply a bandage.

1. Suspensory of the Nose.—*Composition.*—It is prepared by folding a square piece of muslin through its middle, and then cutting it into the form of a triangle by making an incision through the lines B C and C D, Fig. 79; making, also, an opening at A to correspond with the nostril. A vertical and a horizontal band are then to be attached to its edges.

Application.—Place the nose within the suspensory, carrying the vertical band over the summit of the head to the neck, where it should be secured by the horizontal bands, which are made to cross on the occiput, and to pass from thence to the forehead, where they are to be fastened. (Fig. 79.)

Fig. 79.

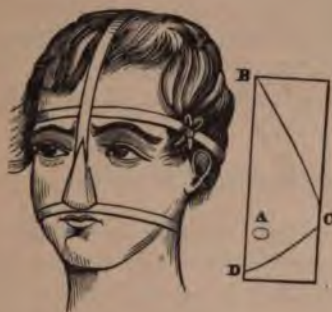
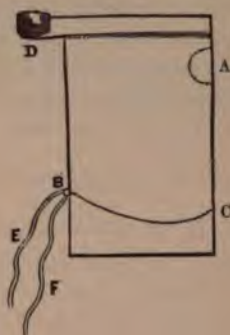


Fig. 80.



Use.—To confine dressings to the nose.

2. Suspensory of the Scrotum.—*Composition.*—Having a piece of muslin of the proper size, say six inches by four, fold it upon itself lengthwise, and cut an opening, A, for the penis, and cut off the lower angles by making an incision in the line B C, Fig. 80. Sew the divided edges of the curved portion together; attach a horizontal band, D, to the upper part, and two vertical ones, E F, to the lower angles, making a buttonhole in the end of each strip; then sew two buttons on the transverse band to afford attachment for the perineal bands.

Application.—Pass the penis through the circular opening, A, envelop the scrotum completely, and carry the belt, D, around the back of the pelvis to return in front and fasten above the pubes. Direct the vertical straps beneath the perinæum, and along the inferior border of the glutei muscles over the hip, to button to the horizontal band in front. The ready-made suspensory bandage found in the shops is applied in the same manner, and, owing to its simplicity and usefulness, is to be highly recommended. (Fig. 56.)

Use.—In the treatment of swelled testicle, hydrocele, irreducible scrotal hernia, etc.

V. — The Sheath.

Sheaths are coverings resembling the finger of a glove, and are designed to retain dressings to the penis, fingers, and toes. They are commonly known as "finger-stalls." A most satisfactory use can be made of them in cases of gonorrhœa, by their

retaining a mass of charpie on the head of the penis to absorb the discharge, and thus prevent the linen from becoming soiled. They are very convenient in this and other affections of that organ, as they are not readily deranged by erections. The band securing it should pass around the hips; or, if applied to the finger, around the wrist; if to the toes, around the ankle.

VI.—The Laced or Buckled Bandage.

These bandages are made from some more or less elastic material, as buckskin, flannel, caoutchouc, knit woolen, or gum-elastic cloth, and are applied to surfaces requiring a constant and equable pressure. They are retained to the part by the use of straps and buckles, or cords passed through eyelet-holes; whence their name.

1. Laced Bandage for the Knee.—This bandage may be made of any of the materials named above, and should be made to order, as its utility depends almost entirely upon its fitting accurately. It is used in dislocations of the patella, and in chronic enlargements of the joints.

2. Laced Stocking.—If this cannot be conveniently obtained ready-made, take a strongly knit stocking and slit it down the side, and hem to each edge a thin strip of whalebone; then work

Fig. 81.



Fig. 82.



a few eyelet-holes, in order to lace it firmly. (Fig. 81.) It is employed in making pressure upon varicose veins, tender and extensive cicatrices of the leg, and in ulcers.

3. Laced Gaiter, for the Foot.—This is made of buckskin, cloth, or kid, and laces along the side of the ankle and foot. It is particularly useful in giving support to the part, in weakness of the lower portion of the leg or foot, occasioned by sprains, etc.; also, in old ulcers, and in cedematous swelling of this extremity. (Fig. 82.)

VII.—Compressed Sponge.

Another method of reducing swelling in the soft structures, as well as in the large articulations, is to place a layer of dry sponge about the joint; apply a roller over it firmly, beginning at the extremity and ascending, covering in the sponge, and then mounting above the joint a short distance. After this, moisten the sponge, and bandage so as to produce even and continuous pressure.

CHAPTER II.

The Handkerchief System of M. Mayor.

THIS system of bandaging, proposed by M. Mayor, of Lausanne, Switzerland, in 1838, has some very favorable features to recommend it, among which are the following, enumerated by this surgeon himself: "The handkerchief is found everywhere, and under every circumstance; is adapted to its purpose; is not liable to become relaxed or otherwise deranged, and cannot become corded; it is easy to fasten; may be changed and re-applied with the utmost promptitude, as a single circumvolution of it is often equal to a multitude of turns of the common band; is also more economical, as it may always be washed, and applied to other than to surgical purposes; the thickness and breadth can be varied at will; in short, it is so much the more perfect as it forms one whole; while, each turn of a common band being considered as a piece apart, the derangement of one necessarily entails the derangement of all the rest."

He does not, however, recommend this variety of bandage to the entire exclusion of the common roller; for he observes: "There are cases which require a methodic compression of a

certain energy, such as affections of the mammæ and of the extremities. But, as these are comparatively rare, handkerchiefs should be employed as a general rule, while rollers should form but the exceptions."

Though I have made comparatively little use of this method, still I am disposed to regard it as possessed of some degree of merit, and hence worthy the attention of surgeons. Without giving the system complete, however, as originally introduced, only the more important of its applications will be noticed.

Preparation of the Bandage.

The Handkerchief to be employed should consist of a square piece of linen, cotton, or silk, folded so as to constitute in form an *Oblong*, *Cravat-shaped*, *Triangular*, or *Cordiform* handkerchief; these four modifications comprehending the entire variety that will ordinarily be required.

The *Oblong Square* (Fig. 84) is formed by doubling the *square* (Fig. 83) once upon itself in the direction of the dotted line *a b*.

Fig. 83.

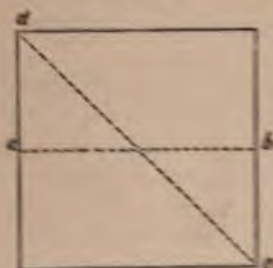


Fig. 84.

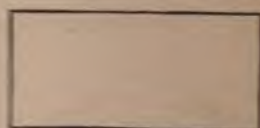
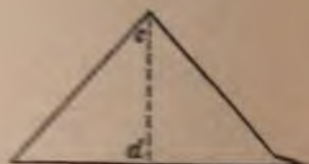


Fig. 85.



Fig. 86.



The *Cravat* (Fig. 85) requires very little explanation, being folded the same as those ordinarily worn about the neck. The body, *a*, is first applied to the part, and the whole secured by means of the ends, *b c*.

The *Triangle* (Fig. 85), like other modifications of the bandage, must correspond with the size of the part to be dressed. The largest size employed is about one yard in length and one-half yard from the apex, *c*, to the middle of the base, *d*. It can be made smaller by folding it upon itself in the direction of the line *c d*, or by cutting off strips from each side. In applying it, the base should first be laid upon the surface, and then the extremities carried smoothly around the parts by making plaits or folds, if necessary. It is made by doubling the square handkerchief upon itself through one of its diagonals; as, for example, in the line *d c*.

The *Cord* is made by twisting the cravat, and may be used as a substitute for the tourniquet.

SECTION I.

The Handkerchief as Applied to the Head.

1. **Fronto-Occipital Triangle.**—*Application.*—Place the base of the triangle on the forehead, the apex passing over the arch of the cranium to the nape of the neck; carry the tails, or angles, transversely around the head, to cross at the occiput; at the

Fig. 87.



Fig. 88.



time covering in the apex, which should be reflected upward and fastened to the vertex (Fig. 88), subsequent to the securing the angles on the forehead. (Fig. 87.)

Use.—A retaining bandage for dressings applied to the head.

2. Fronto-Occipito-Labialis Cravat.—*Application.*—Place the body on the forehead; pass the tails horizontally backward to cross at the nucha; bring them forward to the affected lip, where one of the tails is to be passed through an opening in the other; compresses being placed on each side of the wound, make the traction sufficient to bring the edges in apposition, fastening the ends of the cravat under the ears by means of pins or a few stitches. If a triangle handkerchief be used in preference to the above, the apex must be carried beneath the angles at their point of crossing, and then reflected to the vertex and fastened. (Fig. 89.)

Fig. 89.



Fig. 90.



Use.—To confine dressings in wounds of the lip, and to assist in the approximation of the edges of the opening after the hare-lip operation.

3. Vertico-Mental Triangle.—*Application.*—The body of the handkerchief being placed on the vertex, carry the extremities under the chin; and by continuing them onward, they are made to fasten to the first turn near the ears. The apex can be brought obliquely forward to the side of the head, and pinned. (Fig. 90.)

Use.—A very convenient bandage for retaining dressings under the chin, or in the parotid region.

4. Auriculo-Occipital Triangle.—*Application.*—Place the base of the triangle in front of the affected ear, and carry one

angle beneath the jaw, while the other passes over the top of the head, the two meeting near the sound ear, where they may be tied; or, if greater firmness be desired, turn the angles once around each other, and then make a circular turn around the forehead and occiput. (Fig. 91.)

Use.—To retain dressings to one ear without injuring the other.



Fig. 91.

Many other applications of the cravat may be found useful in special cases. M. Mayor, and others following him, have proposed the employment of it for suspending the foot, for confining the hand to the upper arm, etc. As temporary expedients, such arrangements may answer very well; but they have the inconvenience of causing congestion and swelling of the parts below, since they constrict the limb circularly, and of course hinder the passage of venous blood.

SECTION II.

The Handkerchief as Applied to the Trunk.

1. Cervical Cravat.—*Application.*—Place the body of the cravat on the front, side, or back of the neck, according to the requirements of the case, fastening the angles by pins or by a knot. As very little compression can be safely applied to the neck, this bandage will, ordinarily, prove the most convenient and serviceable.

Use.—A retaining bandage for dressings.

2. The Dorso-Thoracic Triangle.—*Application.*—Place the base of the triangle upon the anterior or the posterior aspect of the chest, as the seat of the injury may require, and tie the tails upon the thorax, either before or behind, while the apex is allowed to repose over one of the shoulders, being attached to the base of the triangle through the intermedium of a band, if it be not sufficiently long of itself to reach this point.

Use.—To retain dressings upon the anterior or posterior face of the chest.

3. Simple Bis-Axillary Cravat.—*Application.*—Place the body of the cravat in the axilla of the affected side; cross the ends very nearly at right angles in front of the corresponding shoulder (Fig. 92), and carry one of them obliquely in front of the chest to the sound side; the other over the root of the neck, behind the chest, and under the arm, to meet its fellow, when they are to be fastened by a knot, taking care to protect the sound axilla by means of a compress.

Fig. 92.



Use.—In retaining dressings to the axilla in the treatment of abscesses; in caries of the head of the humerus; in wounds, hemorrhage, etc.

4. Compound Bis-Axillary Cravat.—*Application.*—The center of the cravat being placed on the axilla of the sound side, carry the tails—one in front, the other behind the chest—to the base of the neck at the opposite side, and tie their extremities; then apply a smaller cravat in the affected axilla, carrying one of its tails through the handkerchief first applied, so that the two may resemble somewhat the links of a chain. (Fig. 93.)

Use.—This bandage may be employed for the same purpose as the preceding; also, in fractures of the coracoid process of the scapula, and in retaining dressings to the stump after amputations of the shoulder-joint.

Fig. 93.



5. Triangular Cap of the Breast.—*Appli-*

cation.—Place the base of the triangle, A B B, obliquely across the chest and under the mamma, directing one of the tails under the axilla of the affected side; the other over the base of the neck of the sound side; the apex, C, to be carried over the shoulder and fastened to the angles on the back. (Fig. 94.)

Fig. 94.

Use.—To retain dressings to the breast, or to afford it support during lactation, and after the operation of extirpating the gland. This bandage may be highly recommended, owing to the simplicity of its application, the facility with which it can be retained in position, and its perfect adaptation to the object to be accomplished. In cases of mammary abscess, and in heavy, pendulous breasts, it is exceedingly useful.



6. Single Spica of the Groin.— *Application.*— Place the body of the cravat obliquely across the front of the pelvis, from the crest of the ilium to the lower aspect of the hip on the opposite

Fig. 95.



side; carry the upper tail of the bandage transversely across the back to the other ilium; then direct the lower tail around the back of the thigh, to ascend in the fold of the groin, meeting the

Fig. 96.



other angle at the ilium of the affected side, where they should be tied. (Fig. 95.)

Use.—To retain dressings to one groin, as in the treatment of bubo. The readiness with which it can be removed renders it preferable to the roller. If it be desired to cover the hip, the cravat can be spread out and applied as represented in Fig. 96; thus forming a very effectual means of retaining dressings to abscesses resulting from disease.

7. Double Spica of the Groin.

—*Application.*—Having two cravats tied together by an extremity of each, place the knot a little on one side of the spine; carry the free ends over the innominata, in the line of the groin, between the thighs, and round their outside, fastening to the bodies of the cravats, as shown in Fig. 97.

Use.—To retain dressings to both groins.

Fig. 97.



SECTION III.

The Handkerchief as Applied to the Extremities.

1. Cervico-Brachial Sling.—

Application.—Tie a cravat loosely around the neck; then place a handkerchief, folded into a triangle, with the base next to the wrist, beneath the fore-arm; carry its angles upward to tie in the cravat, bringing the apex of the triangle around the elbow, to fasten with a pin. (Fig. 98.)

Use.—To support the fore-arm; and it is admirably adapted to this purpose.

Fig. 98.



2. Ante-Brachial Trough.—*Composition.*—It may be constructed of pasteboard or leather, which may be covered by some appropriate material to give it a more finished appearance; then, by means of cords, suspend it from a cravat tied loosely about the neck; or the cords may be made to pass through a ring on the cravat, which will give greater ease and freedom of motion. (Fig. 99.)

Fig. 99.



Application.—Having it thus prepared, it only remains to have the forearm properly dressed and placed in the trough. If it be desired to support the hand, a thin piece of wood can be laid at the bottom, permitting it to project far enough to answer the purpose.

Use.—To afford support to the forearm and hand in cases of injury.

3. Metatarso-Malleolar Cravat.—*Application.*—Place the body of the cravat obliquely across the instep, and carry one extremity above the other around the sole of the foot and instep, to join it in front of the ankle. (Fig. 100.)

Use.—To retain dressings.

Fig. 100.



Fig. 101.



4. Cap of the Foot.—*Application.*—Placing the base of the triangle under the instep, carry the summit, or apex, over the toes, and the tails around the malleoli to enclose the foot. (Fig. 101.)

Use.—To retain dressings to the fore part of the foot.

5. Tarso-Pelvien Cravat.—*Application.*—Pass one cravat around the pelvis, and with another tied around the foot, fasten it to the band first applied, (Fig. 102, B.)

Fig. 102.



Fig. 103.



Use.—To support the limb, or to keep the foot extended, as in ruptured tendo-Achillis.

6. Tibio-Cervical Cravat, or Sling.—*Application.*—Pass the body of a cravat over the shoulder opposite the affected limb, allowing the angles to fall obliquely across the body to a point immediately above the ilium of the injured side, where the extremities are to be tied to each other. Then flex the leg to the required angle, applying a triangle so that its base will

correspond to the ankle, and the apex to the knee; carry the tails upward along the thigh, to attach them to the cervical cravat, near the pelvis. (Fig. 103.)

CHAPTER III.

Duties of Surgeon and Assistants.

SECTION I.

Duties of the Surgeon.

THE object of every operation is the removal of some affection, constitutional or traumatic, which cannot be cured by remedies, and which either places the life of the patient in jeopardy or seriously interferes with the comfort and utility of existence; and hence the more perfectly the surgeon can accomplish this object, the more fully will his duty be discharged. Success, then, is the great end to be attained; but let no one so misapprehend the importance and the responsibility of operating as to regard rapidity and elegance of execution the only requisites by which to secure eminence in the profession. There are various other qualifications equally or still more necessary, which can only be afforded by an intimate acquaintance with the *science* as well as the *art* of surgery, together with a thorough knowledge of medicine. There is to be made a correct diagnosis—in all instances a *sine qua non* to any operation—concerning the nature and extent of the connections of the disease; obscure visceral affections are to be detected and removed; the moral and physical condition of the patient must be comprehended and regulated preparatory to the operation, and the most favorable time chosen for its performance. After its completion, the general health must be attended to, and every available means brought into requisition to combat successfully any sequelæ or complications that may arise. Error of judgment has often induced operations which were in no wise consistent with good surgery or with the indications of the case. The propriety of amputations has been more than once subsequently doubted; operations for fistula in ano, and the performance of plastic operations; have frequently left

the patient in a worse condition than he was previously. As simple a matter as the opening of an abscess has led to the most serious results, and I have often seen the treatment of a felon terminated most unfortunately to the patient. The simple application of a roller has often resulted in mortification and loss of limb, and the most simple operations in minor surgery have left behind them consequences disastrous to the patient and a lasting reflection on the practitioner. It may be said, however, that success in operative surgery depends in a great measure upon the selection of cases; and no surgeon, who properly estimates his own reputation and the credit of the science, will hazard an operation in a notoriously hopeless case, with a view of giving the patient what is called a "last chance;" for usually in such instances the sufferer is hurriedly dispatched in advance of his time by the interference.

The state of the patient's constitution influences the success of an operation far more than the mechanical dexterity with which it is performed. It is no uncommon circumstance to see patients sink after the most skillfully performed operations for hernia, stone, ligature of arteries, etc., owing to some morbid condition of the system that disposes to diffuse inflammation; whereas some patients will make the most remarkable and rapid recoveries after they have been mutilated with little or no skill. Persons of an irritable and anxious mind, or if depressed by fear, and especially feeble and hysterical women, with little power of circulation, cannot bear the shock and exhaustion of even minor operations as well as those of a more tranquil mental constitution and of robust health. Those, too, who are addicted to the habitual use of alcoholic stimulants are also very unfavorable subjects for operations. The condition of the patient's heart, also, should be a matter for consideration before deciding in favor of the use of the knife. Fatty degeneration of this organ, as indicated by its feeble action, by irregularity and want of power in the circulation, by breathlessness, and by a distinctly marked arcus senilis, should make the surgeon cautious about hazarding an operation attended with much loss of blood, or shock to the nervous system. Disease of the lungs of a phthisical character, when active or advanced, is incompatible with the success of an operation, as a general rule. Perhaps the most serious constitutional affection militating against the success of an operation is a diseased state of the kidneys, with albuminuria or diabetes, as

the inflammatory action that is set up is apt to run into a low, diffuse, and sloughing form. And it is especially to be observed, that, unless there exists the most urgent necessity, no operation should be performed while the patient is suffering from erysipelas, phlebitis, or any diffuse inflammation; and, should there even be an epidemic prevalence of these diseases, no operation is advisable.

The *causes of death* are partly dependent upon the effects of the operation itself; but, in the majority of cases, they are due to a want of the proper hygienic measures. Fatal diseases will sometimes supervene on the most simple operations, as the removal of a finger or toe, the opening of a felon or of small encysted tumors of the scalp, being generated by some condition of the system altogether unconnected with the wound that has been inflicted,—a condition which only required a local disturbance to call it into activity. These local inflammations present themselves to the surgeon as a most formidable enemy, being regarded as the most frequent cause of fatal results consequent on operations. They are of a diffused, congestive, or adynamic character, and are divided into two distinct kinds, according as they attack the wound itself, or some portion of the system remote from the seat of the injury. In the first kind are found the various forms of erysipelas, diffuse inflammation of the cellular tissue, phlebitis, hospital gangrene, diffuse suppuration of bone, etc. The other variety includes those secondary affections which attack some internal organs, as the lungs, liver, brain, or gastro-intestinal membrane. The most frequent of these complications is congestive inflammation of the lungs, which is an almost invariable accompaniment, if not a cause, of death in surgical fevers. In view, then, of the serious embarrassments likely to arise from an error in diagnosis; in view of the danger consequent on every important operation, owing to its depressing effect on the system, and the complications liable to ensue requiring mature judgment and the most consummate skill, that they may be conducted to a favorable termination,—together with the duty which every surgeon must feel he owes to the profession,—it becomes a matter of the very first consequence that the operator comprehend and appreciate the full measure of the responsibility attaching itself to him in the performance of every operation. But, having been convinced of the propriety of having recourse to the knife; having fully and unreservedly laid before the patient and family the

reasons that render an operation imperative ; having, furthermore, carefully considered each successive step to be taken, provided for every emergency which can possibly arise,—he should proceed to the performance of his duty with self-reliance, and with that full confidence which facilitates the accomplishment of every undertaking.

SECTION II.

Duties of Assistants.

Different operators vary much respecting the number of assistants whom they employ ; some surgeons preferring to do nearly everything for themselves ; whereas others leave all the minor arrangements to their subordinates, confining their duties only to the chief steps in the operation. In all capital operations, however, four will usually be required,—one for the administration of the Chloroform, another to command the arteries, a third immediately to assist the operator, and the fourth to hand sponges, instruments, etc. Each one is thus to have his duty assigned him, and to which he should strictly confine himself, offering no suggestions nor asking any questions during the progress of the operation. Neither should the surgeon be hindered by others crowding near him to see what he is about. The responsibility rests with him entirely, and every advantage should be accorded to him that will in any manner contribute to his success. The assistants should always be previously made acquainted with the object of the operation, together with the peculiar views of the surgeon ; the latter also specifying the emergencies that may arise, and the change of duties which would be required in the event of any accident. Though the assistants themselves be practitioners, which is usually the case, these brief hints are equally applicable, as they are quite as likely to become over-officious as their more unprofessional friends. In short, silence and attentiveness are especially to be enjoined during the performance of an operation. By observing these brief though exceedingly important rules, much confusion and embarrassment will often be obviated.

CHAPTER IV.

General and Local Anæsthesia.

ALTHOUGH the inducing of anæsthesia is attended with a certain degree of danger, still, the immunity from pain which is thus purchased has more than counterbalanced the fears and prejudices concerning it; and hence, the introduction of anæsthetics into surgery has undoubtedly accomplished more in elevating the "chirurgic art" to public esteem than any other adjuvant possessed by the profession. It is not only invaluable to the patient in preventing the occurrence of intense pain,—which may of itself, if long protracted, even produce death,—but it also relieves the surgeon of the distress of inflicting it, and enables him to operate with greater facility than might otherwise be possible. The administration, however, of so powerful an agent as either Chloroform or Ether, must be conducted judiciously, or even with caution, as otherwise very serious consequences may ensue. But simply because anæsthetics are liable to abuse, *is no good reason why they should not be properly employed.* The same argument would be equally as valid against the most valuable remedies of the *Materia Medica*.

Chloroform.—Chloroform is by many surgeons preferred to Ether. It is obtained by the distillation of chloride of lime with rectified spirit, and should never be employed without testing its purity, which, according to Fleming, of Dublin, is accomplished by holding a piece of litmus paper over the mouth of the bottle; if the vapor reddens or bleaches it, the article is unfit for inhalation. Secondly, drop a little into a glass of water, or a solution of nitrate of silver. If the Chloroform remains like a transparent globule at the bottom, it is good; but, if the globule appears like a muddy lens, or becomes opalescent, it is adulterated, and unfit for inhalation.

The severity of an operation should in all cases determine the extent to which it should be given. In the greater operations, as

amputations, lithotomy, and the ligature of arteries, etc., a sufficient quantity should be given to paralyze muscular movement, as well as to suspend sensibility and consciousness. It is also necessary to induce complete muscular relaxation in operations implicating the abdominal walls, as without it great inconvenience and perhaps danger might result. In short, an entire loss of consciousness should be effected in all of the more important operations, and especially in those which are necessarily somewhat protracted, and would otherwise be intensely painful. There are certain diseased conditions of the system which require that it should be administered with the greatest care; such, for example, as fatty degeneration of the heart,—though in valvular disease of this organ it can undoubtedly be given with impunity. In persons who are epileptic, and in those who suffer from congestion of the brain, much caution should be exercised, as well as in the case of hysterical patients, as it is likely, in case of the latter, to induce laryngeal spasms. But the most dangerous condition is that supervening on renal affections, the blood being loaded with urea. In such cases epileptiform convulsions are readily excited, accompanied by lividity of the face, and a tendency to stertor and coma. It can, however, with scarcely an exception, be inhaled with perfect safety in the early stages of phthisis. Dr. Simpson, of Edinburgh, states that he has given it to "persons suffering under chronic pulmonary disease, not only without injury, but in some cases with decided benefit."

From the experiments of Dr. Russell, and other extensive researches on this subject, "it seems now a fair conclusion that the asphyxia which we often see in these deaths from anæsthetics, is caused by the direct action of the anæsthetic agent on the vagus, which so immediately influences the vascular system. Dr. Richardson remarks, upon a careful examination of this subject, that he infers, that, in every case of death from Chloroform, the cause of death is paralysis either of the motor or of the controlling nervous mechanism of the heart. I conceive that any primary organic changes of structure leading to death are situated in that mechanism, and must be looked for *there*; and I think that there is fair ground to assume, that, in some cases, there may be death when there is no actual disease of structure, but simply so extreme a natural delicacy of balance between the nervous functions, that the excitation produced by the Chloroform is sufficient to arrest motion and destroy life."

"Fatal cases, no doubt, will continue to occur from time to time, and must always be set down as belonging to those so well classified by Sir James Paget as 'surgical calamities.'" — *Helmuth*.

I have always exercised the utmost care and vigilance in the administration of Chloroform or any of its preparations, and really feel that the responsibility is greater ordinarily from the effects of the anæsthesia than from those of the operation. An interesting table, collected by Dr. Coles, gives the following statistics: "Deaths from Ether, 4 in 92,815 inhalations, or 1 in 23,204; deaths from Chloroform, 53 in 152,260 inhalations, or 1 in 2,872; making about eight deaths from the latter to one of the former." Death from Chloroform may occur in three different ways; viz., from coma, asphyxia, or syncope; that is, its influence may become fatal by its action on the brain, the lungs, or the heart.*

Mr. Lister is a strong advocate of the theory, that all that is necessary for safety in Chloroform inhalations "is to watch the breathing, and, when any lividity of the face occurs, or any laryngeal stertor, to pull the tongue out of the mouth with a pair of forceps sufficiently far to open the larynx freely, and allow the patient to breathe naturally, withdrawing the cloth till the indications of returning sensibility necessitate the re-administration of the vapor." Both the pulse and respiration should be watched most narrowly, especially the latter, as it is the side from which danger most commonly occurs. On the first symptom of failure of the pulse, suspend the Chloroform; let the patient inhale the vapor of Nitrite of Amyl cautiously, apply the galvanic battery, slap the breast with cold towels, while hot affusion is practiced to the head. If necessary, artificial respiration should be resorted to, the tongue being held forward, and the head of the patient depressed.

* In Circular No. 6 of the Report on the Extent and Nature of the Materials available for the Preparation of a Medical and Surgical History of the Rebellion, p. 87, the following interesting statement is made:

"There have been consulted, in regard to the employment of anæsthetics, the reports of 23,260 surgical operations performed on the field or in general hospitals. Chloroform was used in sixty per cent of these operations, Ether in thirty per cent, and in ten per cent of the cases a mixture of the two was administered. At the general hospitals, the greater safety of Ether as an anæsthetic was commonly conceded. It was often employed, and no fatal accident from its use has been reported. In the field operations, Chloroform was almost exclusively used. The returns indicate that it was administered in not less than 80,000 cases. In several instances, fatal results have been ascribed, with apparent fairness, to its use."

Ether.—Ether (Sulphuric) is obtained by heating together equal parts, by weight, of oil of vitriol and alcohol. It may be washed and tested in the following manner: Pour about six ounces of the liquid into a large bottle, and add half a pint of water; agitate them by shaking, and pour all the contents into a filtering-glass, or decant the Ether carefully. The Ether, being slightly soluble in water, and lighter, will float, and may be readily poured off, while any alcohol it may contain will unite rapidly with the water, and sink with it when the agitation ceases. If any sulphuric acid is present, litmus paper, dipped in the Ether, will be reddened; but, if free from the acid, the paper will remain unchanged. If the Ether, when poured on a cloth and allowed to evaporate, leaves much odor, it is impure.* This agent was first introduced as an anæsthetic by Dr. Horace Wells,† of Hartford, Connecticut; but the profession is indebted to Dr. Warren for the most valuable suggestions which have ever been offered respecting its administration and utility. Its effects are not so soon manifested as those produced by Chloroform, but are attended with a somewhat higher degree of excitement. Few deaths having resulted from its use, American surgeons have, in civil practice, employed it almost entirely in preference to Chloroform; though the two combined, in the proportion of one part of the latter to three parts of the former by weight, have been quite extensively used, and undoubtedly constitute the most reliable agent employed.

Manner of Administering Anæsthetics.—Having the patient placed in the most convenient position for the operation, the *neck being freed* from all constriction produced by any portion of the dress, and the *stomach empty* for at least three hours previous to the operation, the assistant who is to administer the anæsthetic should place himself near, and, if convenient, behind the patient's head; then pouring half an ounce of the liquid over the surface of a cup-shaped sponge, or a towel folded into a similar shape, apply it over the mouth and nostrils to within, at first, about two inches of the surface. After a few long and deep

* Jackson on Anæsthetic Agents.

† The American Medical Association, at its meeting in Washington, D. C., 1870, adopted the following resolution: "That Dr. Horace Wells, of Hartford, Conn., was the discoverer of *anæsthesia*."

inspirations have been taken, the sponge should be raised to allow a breath or two of air, when it may be replaced a little closer. But especially should it be recollected that in no instance is it safe to neglect to raise the sponge frequently to admit fresh air to the lungs. During the administration the pulse is to be closely watched, which will at the commencement be somewhat quickened, but will soon begin to diminish in frequency, when the inhalation may be checked. At this time careful attention must be paid to the perfection of the respiration; for so soon as the *breathing becomes stertorous*, the instances are rare that the patient has not entirely lost both sensibility and consciousness, when of course the sponge should be removed. The state of the muscles may be determined by raising the arm, which, if it fall as if lifeless, the pulse being full, is good evidence—together with the loss of sensibility, which may be ascertained by pinching a fold of the skin—that the operation may safely proceed, the sponge being re-applied as often as the patient begins to revive.

Dr. Simpson* has observed, that, in order to induce the most perfect anæsthesia, the following conditions are necessary: First, the patient should be left in a state of absolute quiet and freedom from mental excitement, both during the induction of Etherization and in the recovery from it. All talking and questioning must be strictly prohibited. Secondly, the primary stage of exhilaration should be entirely avoided, or at least be reduced to the slightest possible limit, by impregnating the respired air as fully with the vapor as the patient can bear, and by allowing it to pass into the lungs both by the mouth and nostrils, so as to superinduce its effects rapidly.

The Sickness of Anæsthesia.—After the exhibition of anæsthetics, there remains in some individuals a deadly sickness or even nausea and faintness. In such cases, brandy, whisky, or other stimulants do harm, by increasing these nervous derangements after the stimulating effects have passed away. Dr. Helmuth in such cases recommends “ten or fifteen drops of Chloroform in six tablespoonfuls of water, and to give a tablespoonful once in thirty minutes.” I have tried this practice often, with good results at times, and at others without the least benefit. Dr. Burdick, of New York, speaks highly of *vinegar*, which he administers to the patient by inhalation while passing under

* Simpson on “Anæsthesia,” p. 27.

anæsthetic influence. He also recommends its application *locally* to the head, and permits the patient to hold in his mouth a linen cloth saturated with it.

I have employed, with excellent results, Ipecac; and Electricity, applied over the stomach, I have also found efficacious. *Veratrum*, *Ammonia*, *Causticum*, and *Camphor* are remedies of value in the sickness from Chloroform. An Electric disc laid upon the epigastrium allays the vomiting quickly.

Resuscitation of a Patient when Overdosed by an Anæsthetic.—The measures adopted must be prompt and efficient, and conducted upon the following principles: First, the establishment of respiration, either natural or artificial, so as to empty the lungs of the vapor contained in the air-cells. Second, the stimulation of the heart's action, and the maintenance of the circulation. The first principle is particularly applicable in the asphyxial form; the second, when symptoms of syncope are present. The means to be employed in accomplishing the object stated in the above principles are given in the following rules:

1. Thrust the forefinger into the top of the larynx, and remove the epiglottis from it, if spasmodically closed.

2. Induce artificial respiration by pressing alternately on the chest and abdomen, so as to excite the diaphragm, breathing at the same time into the patient's mouth, while the larynx is pressed gently backward so as to close the œsophagus, and prevent the air passing into the stomach.

3. Apply strong aqua ammonia on a sponge so soon as the patient gasps, or before, if the effort is not made soon.

4. Dash cold water on the face, top of the chest, and head.

5. If an electro-magnetic apparatus be at hand, muscular action may be sustained in the heart and chest by applying one of the electrodes over the phrenic nerve, at the point where the omo-hyoid muscle crosses the sterno-cleido-mastoid; the other electrode should be pressed firmly into the seventh intercostal space, alternating the application of each so as to create a shock.

Inhalations of *Amyl Nitrite* have been much lauded for the evil consequences that follow the over-dosing of anæsthesia. Sir James Paget attributes these deaths to circumstances entirely beyond the control of the surgeon, and not inaptly terms them "surgical calamities." A few points of importance in connection with this subject may be mentioned. It is well that the patient's

stomach be not over-loaded before administering anæsthetics. A cup of warm broth may be given two or three hours before Chloroform is administered: this tends to decrease the liability to sickness at the stomach, and to prevent the frequent attacks of fainting.

A severe chill, occurring on the emergence of a patient from a condition of anæsthesia, is of short duration, and readily yields to restorative measures. It denotes a profound disturbance of the ganglia at the base of the brain. A renewal of hemorrhage from wounds is not an infrequent consequence of a return of the patient to consciousness, and is a condition attributable to previous cachexia rather than to the effects of anæsthesia.

Nitrous Oxide.—This agent, prepared by heating pure nitrate of ammonia, and collecting the gas over water, is chiefly used by the dental profession in the extraction of teeth, and is also successfully employed in the removal of small tumors, evacuating abscesses, opening felons, and in other simple operations. Its effects, however, are too evanescent to render it reliable in operations of any considerable magnitude; which, together with the time and care required for its manufacture, and the cumbersome character of the apparatus necessary for its administration, will be quite sufficient to prevent its superseding the use of Ether and Chloroform to any great extent.*

Dichlorethane.—This agent holds an intermediate position in its properties between Ether and Chloroform. Some surgeons prefer it to any other anæsthetic; but its liability to produce vomiting and syncope, is the reason that it has not been in more common use.

Local Anæsthesia.†

Ancient Use of Anæsthetics.—The term Anæsthesia is of ancient origin. It is mentioned in the writings of Dioscorides, who flourished fifty years after the birth of Christ, and who, in speaking of a plant called Mandragora, says "that it was given to cause insensibility in those who were to be cauterized or operated upon; for, being thrown into a deep sleep, they do not perceive

* This agent is now being used extensively by the dental profession as an antidote to the baneful effects of Chloroform.

† Contributed by T. G. Comstock, M. D., of St. Louis.

pain." Such Greek writers as Pliny, Apuleius, Aretæus, Celsus, and others, speak of it, and ascribe to it anæsthetic properties. It appears, from recent investigations, that the Chinese have for more than a thousand years employed a preparation of hemp, or ma-yo, to deaden the pains attendant upon surgical operations. If the records of medicine are carefully examined for six hundred years past, many allusions will be found which refer to the description of medicines acting as anæsthetic agents; and, by referring to Holy Writ, in Amos, chap. ii., 8th verse, will be found the following: "And they lay themselves down upon clothes laid to pledge by every altar, and they drink the *wine of the condemned* in the house of their God." The "wine of the condemned" here spoken of is believed to have been some narcotic in common use in ancient times, and administered to condemned criminals. It has been asserted by some biblical commentators that the "vinegar and hyssop," given to our Blessed Saviour to drink when he was being crucified, was in reality some narcotic. It was a common practice among the Romans and Greeks to administer such agents to criminals before and after condemnation.

The inhalation of Ether and Chloroform is familiar to every one at the present day; but we well remember how the profession was thrilled at the idea of the benefits such agents must give to surgical practice, when the first successful experiments were made with the former twenty years since. And yet, if we refer to the writings of Baptista Porta, in 1608, in his book upon "Natural Magic," we will find that he describes a "pomum somnificum," made of Opium and Mandragora, "the smelling of which binds the eyes with a deep sleep;" and then he speaks of a quintessence, "which, if you hold to a sleeping man's nostrils, whose breath will suck up this subtle essence, which will so besiege the castle of his senses that he will be overwhelmed with a most profound sleep, not to be shook off without much labor. After sleep, no heaviness will remain in his head, nor any suspicion of art. These things are manifest to a wise physician;—to a wicked one [undoubtedly referring to the charlatans and mountebanks] obscure." Who can fail to recognize a pretty good description of the effect of some anæsthetic agent inhaled in the same way as we give Chloroform and Ether at the present day?

Only twenty years ago, when, by the use of Ether, limbs were amputated without pain, the world looked on with astonishment; and not a few of our own profession were incredulous, and refused

to have any part, parcel, or countenance in any such innovation. Yet, a little more than one hundred years earlier, Frederick Augustus II., the Strong, Elector of Saxony and King of Poland, had his leg amputated without any cognizance of it, his surgeon having administered to him some secret anæsthetic agent, and induced upon him a deep sleep, when his limb was amputated; and all this without even the consent of his Royal Highness, who was not aware of it until the following morning. The history of anæsthetics proves the adage that there is "nothing new under the sun." To our countryman, the late Dr. Horace Wells, of Hartford, Connecticut, is due the immortal honor of discovering the use of Ether, when given by inhalation, in annulling the pain of surgical operations; and to Sir J. Y. Simpson, of Edinburgh, for the discovery of Chloroform, in 1847. The general effects of Ether and Chloroform, we do not propose to speak of further than to mention that they are anæsthetic agents operating upon the whole system; and it has long been a desideratum to find an agent that could be applied locally to a part,—one that would temporarily deaden any portion of the human body, so that an operation could be made without pain. Such a discovery has been made by Dr. B. W. Richardson,* of London.

Apparatus for Local Anæsthesia.—It has long been known that the application of a freezing mixture to a part acts as a local anæsthetic; and many operations have been made, assisted by this proceeding, with success, and without pain to the patient. This was first suggested and brought into actual practice by Dr. Arnott; but it was not practicable, because not convenient, and not sufficiently under the control of the operator, and was, therefore, abandoned. For some years past, surgeons have made numerous experiments to produce local anæsthesia with Chloroform, Indian hemp, Aconite, etc., by immersing the hand in them for hours, but without success; the results were negative and unsatisfactory.

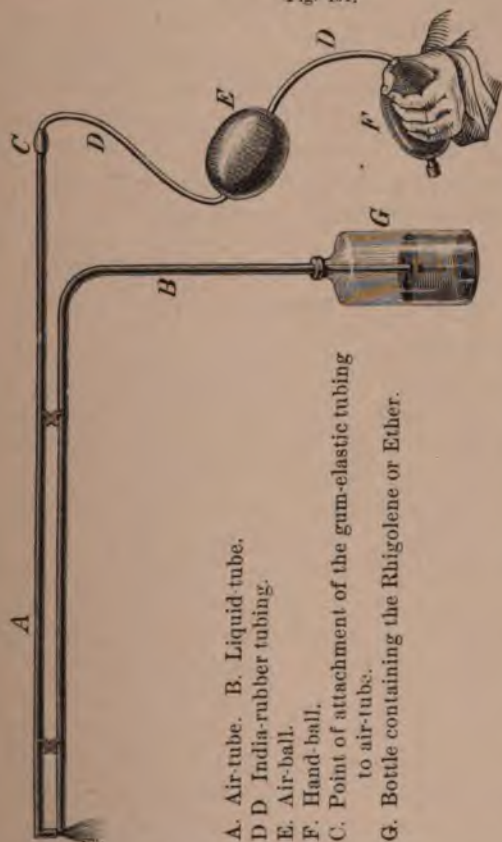
Dr. Richardson was struck with the idea that an instrument in common use in England and upon the Continent, for diffusing the spray of eau de Cologne, might be employed for producing local anæsthesia. His first idea was to find out the degree of cold that could be suddenly produced upon any part of the human

* See *London Medical Times and Gazette*, of February, March, and April, 1866.

body by the rapid vaporization of such volatile liquids as had the lowest boiling point; the rule being, that the lower the boiling point of the volatile liquids selected, the greater and the more rapid would be the cold generated, and of course a temporary anæsthesia would result. Dr. Richardson made several trials with imperfect instruments to effect a rapid vaporization of Ether, with more or less success; and finally constructed one, which he describes as follows:

The apparatus consists of an ordinary two-ounce (Fig. 104) bottle (graduated or not), for holding the Ether. This bottle is

Fig. 104.



- A. Air-tube.
- B. Liquid tube.
- D. D. India-rubber tubing.
- E. Air-ball.
- F. Hand-ball.
- C. Point of attachment of the gum-elastic tubing to air-tube.
- G. Bottle containing the Rhigolene or Ether.

Apparatus for Local Anæsthesia. — Dr. Bigelow's Tube.

For extracting teeth, the tubes are made double, and so arranged that a nebulized spray will simultaneously strike the inside and outside of the gum.

provided with a perforated cork; and passing through it into the bottle is a double tube, made of metal, so arranged that an inner tube is enclosed within the outer tube, and the smaller one is so

constructed as to reach within a short distance from the bottom of the bottle, and upward to nearly the mouth of the outer tube. The bottle has attached to it, at right angles, just above the top of the cork, another tube a few inches long, communicating with it; and to this is attached a piece of India-rubber tubing and two elastic balls, with proper valves, which, by alternately expanding and contracting, produce a double current of air: one current, descending into the bottle, pressing upon the Ether, forces it along the inner tube; and the other, ascending through the outer tube, plays upon the column of Ether as it escapes through the fine jet. (Fig. 104.)

Dr. Andrew Clark, of London, has introduced a modification of the Bergson tubes, by attaching an India-rubber tube to the horizontal limb, terminating in two hollow balls. The one at the extremity, by compression and relaxation of the hand, throws the air into the distal ball, which acts as a receiver. By this continued manipulation a steady and continuous spray is produced. Dr. Robert Newman, of New York, has recently invented an ingenious instrument for this purpose, which greatly facilitates the operation; as the different directions in which the spray may be thrown makes it readily applicable to every portion of the body, especially the deep cavities.

The Principle of the Process.—The principle of this new anæsthetic process consists in directing to any part of the human body a volatile liquid having the lowest boiling point, and in a state of fine subdivision or spray, such subdivision or atomization being produced by the action of air or other gaseous substance on the volatile liquid to be dispersed. When the volatile liquid, such as Ether, falls upon any part of the human body in the form of a spray, there will be a rapid evaporation of the same, and consequently an intensity of cold will immediately take place, and to such a degree as to temporarily constrict the blood-vessels, and prevent the circulation from going on. There will be, consequently, an insensibility, and the part will die for the time being; but, the effect being entirely local, the general circulation is not affected, and soon the blood will return to the part, and complete restoration take place.

Dr. Richardson says: "The extreme rapidity of the action of this deadening process is the cause of its safety; the process can suspend life without causing disorganization. If I may use the expression, it produces syncope of the part,—temporary death,—

but not, necessarily, destruction. When we produce general anæsthesia, we virtually extend this mere local action to the body altogether,—i. e., we check the evolution of the force at the center, and produce an approach to temporary death of the whole of the organism."

Special Indications for the Use of Local Anæsthesia.—It is not only applicable to a large number of minor operations, but will be found in time serviceable in some capital operations,—such operations as the extraction of teeth, removal of the toenail, opening of felons, probing of wounds, operations for necrosis, removal of small tumors, ligating or excising piles, applying caustics, either the mild or potential; incising carbuncles, opening abscesses, especially mammary abscesses; applying sutures, dividing tendons, fistula in ano et perinæo, rupture of the perinæum, alleviating painful piles, returning painful hemorrhoidal tumors within the rectum; operating for vesico-vaginal fistula, harelip, laryngotomy and tracheotomy; removal of cancers, condylomata, or extensive syphilitic mucous-tubercles, paraphimosis; opening of buboes, or other painful abscesses; relieving the pain of neuroma, and facilitating the removal of such tumors; alleviating the pains of photophobia, neuralgia, or periostitis. It will act as a hæmostatic agent in stopping the flow of blood when it is excessive and threatens danger, especially in the following operations: In cutting down upon arteries to ligature them, or operating for any form of strangulated hernia, extirpation of ovarian tumors, tracheotomy, œsophagotomy, Cæsarean section, stone in the bladder, and in any other cases where the almost instantaneous application of intense cold to congelation will produce a coagulum of blood and contraction of the open mouths of blood-vessels.

Various Preparations Used to Produce Local Anæsthesia.—Dr. Richardson's experiments have mostly been made with Sulphuric Ether, and to produce the required result when Ether is used, takes at least one minute or more; but with Rhigolene, a new hydro-carbon recently discovered by Dr. J. H. Bigelow, of Boston,* it requires not more than five to ten seconds. This Rhigolene is a petroleum-naphtha, and is one of the most volatile of all known liquids; it boils at 70°, while common Ether boils only at 96° of heat. Rhigolene is cheaper than Ether, has but

* *Boston Medical and Surgical Journal*, April 19, 1860.

little smell, and the odor is far less disagreeable than Ether: it is so volatile that it can be atomized with less trouble, and the apparatus necessary for this purpose is less complicated and expensive than that in use when Ether is selected as the preparation to be atomized. With Rhigolene, the ordinary Bergson or Siegle tube, in use with the "spray-producers" for conducting an inhalation, is quite sufficient. Dr. Bigelow does not use the rather complicated tube of Richardson, which we have described above, but a single metal tube, bent at right angles, and passing through a perforated cork into the interior of a bottle. Attached to this, outside of the bottle, is another tube terminating with a capillary opening, and so arranged as to meet at a right angle the extremity of the other tube, which also terminates with a capillary opening, some six inches beyond the cork of the bottle. This is the air-tube; and the India-rubber tubing with two air-balls (the same as described in Dr. Richardson's apparatus) is to be attached, and then it may be worked in the same manner as Richardson's. Rhigolene is very inflammable, and must be kept in a cool place, and not be used near a fire or lamp. A large experience with both Ether and Rhigolene has convinced me that the latter is by far the most reliable and practicable, and attended with no disadvantages whatever, except that, being so inflammable, it must be used with caution and not brought near any fire.

Hydride of Amyl is procured from the careful distillation of American petroleum, and is so light that it boils vehemently in the hand, and actively in a glass tube when gently held between the fingers. Dr. Richardson of late recommends its use in local anæsthesia, by mixing one part of the Hydride to four parts of Ether, which he terms the "compound anæsthetic ether for local anæsthesia."

Sulphuret of Carbon is preferred to any other local anæsthetics by Prof. Deleomante, of Nancy, who claims for its use more complete and more rapid refrigeration than by any other known substance.

Chloroform has been tried in lieu of Ether and Rhigolene, but it proved very irritating to the skin; yet, when mixed with Ether, in the proportion of one part of Chloroform to seven of Ether, it will act even sooner than Ether alone, and is not irritating. Dr. Richardson recommends a *Xylo-Styptic Ether Spray*, and also a *Ferro-Styptic Ether*, as hæmostatic agents, as more efficient

than pure Ether in controlling hemorrhage. The Xylo-Styptic Ether is prepared by saturating pure Ether (at a boiling point of 97°) with tannin, and then adding Xyloidine. The Ferro-Styptic Ether is prepared by simply dissolving the perchloride of iron in Ether. These preparations must be used through glass tubes.

Electricity has been employed as a local anæsthetic, but is neither so readily applied nor as effectual as *cold*, which latter was recommended by Dr. Arnott, of London, in 1852. He advised the application of a mixture of powdered ice and salt, which should be enclosed in a net of some thin material, and then laid immediately upon the part. This combination produces intense cold, and its action is prompt and harmless, unless kept on long enough to destroy the part entirely. It should not be kept in contact with the surface more than one or two minutes. At first the sensation is that of cold; then of insensibility, if local pain previously existed; the circulation is momentarily increased, and there is a red blush on the skin, which is soon succeeded by a contraction of the superficial vessels and extreme whiteness of the skin, this being followed by congelation of the adipose tissue and total insensibility of the part. At this time the incision may be made without pain and without hemorrhage. This agent is particularly applicable in the removal of small superficial tumors, amputation of fingers, toes, and evulsion of the toe-nail. It might be supposed that the reaction would develop a high degree of inflammation: experience, however, proves the contrary.

CHAPTER V.

Preparation and Manipulation of Instruments.

AMONG the numerous duties devolving upon the surgeon previous to an operation, the preparation of the instruments to be employed should be regarded as one of the most important. The fact that an experienced and skillful operator can accomplish his purpose with illy prepared or poorly selected instruments, while a novice may fail though using the best that can be procured, is a circumstance which does not in the least justify the former in neglecting to have his operating-case in the most capital

order; and hence every reputable and careful surgeon will take especial pains to have his "mechanical therapeia" properly selected, and to see that suitable attention is given to their preparation and preservation.

Sharpening of Instruments.

A magnifying glass will show that the edge of a knife has teeth similar to those of a saw; and, as the tissue to be cut is usually incised by drawing the scalpel toward the operator, it is desirable that its edge be set forward. This is accomplished by carrying the blade, from the heel to the point, along a stone or strop. In using the former, have it previously well lubricated with oil, and place the blade very nearly flat upon it; then, holding the hand in a position of semi-pronation, push the knife from heel to point with its edge forward; now turning the hand in a state of semi-supination, pass the blade in like manner back to the point of starting. If the strop be used, the edge of the knife cannot be made to pass first, but in the reverse manner to that employed on the stone; recollecting, however, in each case to draw the blade from *the heel to the point*, and never in the opposite direction. The manner of holding pointed instruments, such as cataract needles, trocars, gorgets, etc., during the process of sharpening, will readily suggest itself by observing their peculiar shape.

Manipulation of Instruments.

The ability to handle instruments with facility and grace is an accomplishment that proves a decided advantage to the patient as well as the surgeon, and is therefore to be highly appreciated. A full consideration, however, of the directions required to constitute a thorough study of the art of manipulating, that dexterity and gracefulness of execution may be secured, can more readily be comprehended in connection with each operation; and hence only the principles governing the movements of cutting instruments will at present be noticed.

1. Knives, whether large or small, will cut with the greatest facility and neatness when drawn regularly and with moderate, even pressure over the tissue to be divided.

2. The motion given to the instrument should be chiefly that of traction, effected by flexing and extending the thumb and fingers in much the same manner as when using a pen; not

permitting the wrist to participate in the motion except to change the direction of an incision, or when employing the amputating knife.

3. In using the scissors, a slight drawing motion should be given, as it enables them to cut with less contusion of the parts, especially if the structures are dense; and, owing to the fact of their bruising the tissues by the pressing of their blades together, it is better to employ a knife, if it be at all convenient.

4. Instruments for making punctures should possess a keen edge, as they necessarily contuse the parts more or less at their point of entrance, and consequently should, as a general rule, be introduced gradually, to prevent danger of sloughing.

5. A sudden and frequent elevation of the hand from the surface on which it is supported is an error to be invariably avoided, as no incision can be thus made with the neatness and precision that is accomplished by the regular flexion and extension of the fingers, the wrist remaining at rest.

6. The manner of holding the scalpel to facilitate convenience and dexterity will be considered in the following *Six Positions of the Scalpel*, as employed by the French surgeons, and which will be found all that are required in ordinary operations:

The Six Positions of the Scalpel.—*First Position.*—Grasp the handle of the scalpel so that the thumb and the second finger shall be very nearly opposite each other, while the third and little fingers retain the extremity of the handle firmly in the palm, the forefinger resting on the back of the blade. (Plate I., Fig. 1.) By extending the finger well upon the blade, the operator can exert considerable force, thus readily dividing dense tissues, as in the extirpation of scirrhus mammæ, osseous and fibrous tumors, and in the division of tendons, ligaments, etc. When it is required to make an incision in a certain line, the integuments should be made tense and steadied, as in Plate I., Fig. 2.

Second Position.—This is the reverse of the first,—the edge of the knife being upward. In this position the thumb and forefinger should be placed at the sides of the handle, near its junction with the blade, while the remaining fingers are to be employed in pressing it against the palm. (Plate I., Fig. 4.) When the scalpel is held in this manner, it is designed to cut from within outward, by having an assistant raise a fold of the integument from the subjacent parts, as represented in Fig. 4, or in Fig. 2.

Third Position.—In this position the scalpel is held between the thumb and first two fingers very much like a pen, the hand being supported by the other two fingers. (Plate I., Fig. 5.) In commencing an incision, the point of the blade should be inserted into the tissue by a perpendicular pressure of the fingers in an extended position; after which the blade is to be drawn toward the operator by strongly flexing the first and second fingers, and the incision terminated by a perpendicular pressure of the knife at the point where it is wished to stop, in order to prevent making a shallow, irregular cut, called a "tail."

Fourth Position.—This is the reverse of the last, — the edge of the scalpel being upward, so as to cut from the operator. (Plate I., Fig. 6.) This and the third are two very important positions of the knife, and are always required in the removal of tumors, ligation of arteries, etc.

Fifth Position.—In this position the scalpel is held like a fiddle-bow, — the four fingers being approximated on one side of the handle, and the thumb on the opposite side. (Plate I., Fig. 7.) This easy position enables the surgeon to make light, delicate strokes with the knife, as in the division of the tissues over hernia, large blood-vessels, and the like.

Sixth Position.—This requires that the knife be held with the fingers flexed, the edge of the blade being directed toward the hand. (Plate I., Fig. 8.) The tissues being raised on a director, the incision is made toward the operator.

Acupuncturation.—This consists in making punctures through the tissues by the introduction of delicate needles, which may be either of gold, silver, platina, or steel. The manner of performing the operation is simply to support the needle with the thumb and forefinger of the left hand, while with the thumb and forefinger of the other hand it is made rapidly to rotate until the point has penetrated to the required depth. Several may be introduced in like manner at short distances from each other. The most marked benefit has been ascribed to their use in particular cases, accompanied by intense pain, as for example in neuralgia; though the success attending their application has not been so constant as to bring the operation into very general favor.

Electro-Puncture.—In this operation the needles are passed through the skin as far as desired, in the same manner as in acu-

FIG. 3



FIG. 8

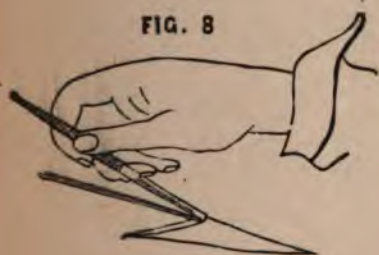


FIG. 7



FIG. 1

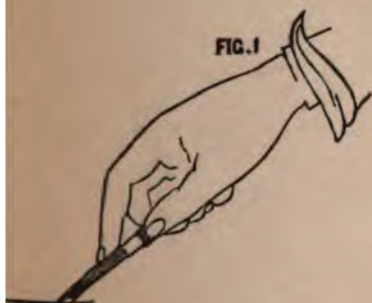


FIG. 5

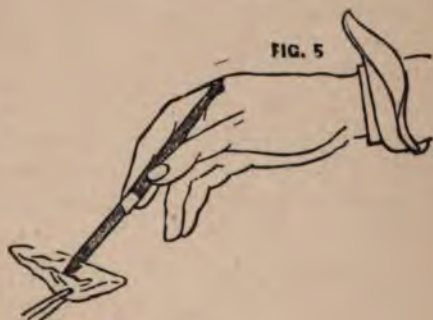


FIG. 2



FIG. 4



PLATE I.

FIG. 6



uncturation, and the electric fluid conveyed to the affected part by bringing the poles of an electro-magnetic machine in direct contact with the head of the needle. Care should be exercised not to make the current so severe and continuous as to heat the needles, and thus convert them into actual cauteries.

This procedure will sometimes be found serviceable in *paralysis*, *rheumatism*, *deafness*, *amaurosis*, etc.; though the cases in which it is particularly indicated are not well marked.

CHAPTER VI.

Incisions.

THE variety of incisions may be indefinitely multiplied to suit the circumstances of the case; though the kinds most frequently employed include—

1. The *Simple Incision*, consisting of a single line, either straight or curved.

2. The *Compound Incision*, which is made by a combination of straight lines forming a cut resembling the letters **V**, **L**, **T**, and **H**, also a **X** or **□**; or of curved lines in the form of an ellipse **○**, or double-crescent **⌒**.

3. The *Subcutaneous Incision*, a variety of incision, which enables the surgeon to effect a division of parts without exposing them to the atmosphere; and hence union occurs with little or no inflammation. It is used principally in dividing tendons, opening joints, and in evacuating chronic abscesses, especially if all the contents of the latter are not to be removed at once. The operation is accomplished by introducing a sharp-pointed knife obliquely through the integument at a little distance from the part to be divided; after pushing the blade forward sufficiently far to allow the edge to rest immediately over the tissue to be cut, depress the edge upon the part, and give a slightly rocking motion to the handle. Carefully withdrawing the instrument as it was entered, close the orifice by adhesive plaster or collodion. This incision is also made—particularly in cases of abscess, where it is desirable to exclude the air—by pinching up a fold of the integument covering the part, and passing the point of a bistoury



CHAPTER VII.

Means of Arresting Hemorrhage.

WHETHER hemorrhage be the result of accident or disease, or incidental to surgical operations, it is always a phenomenon claiming prompt attention, and often demands a manifestation of all the surgeon's skill and self-possession. Hence, it is necessary to be familiar with the various forms which it may assume, and with all the available means for arresting it, including the circumstances to which each method is most applicable.

Every considerate surgeon has a greater or less dread of considerable losses of blood, which may prove either immediately or secondarily fatal to his patient. "The fact, that in a few moments the life of a human being may pass away with the crimson tide which bursts from an open vessel, causes such an occurrence to be regarded with much apprehension; and, added to this, the heart-sickening scene presented by a person dying from loss of blood, the horror-stricken faces of bystanders, and the disorder and confusion which are often present on such occasions, have taught us to regard hemorrhage always with certain feelings of anxiety." (Helmuth.) "The suppression of hemorrhage," says Professor Thompson, "and the reunion of divided surfaces, are, in every wound and in every operation, the first and ultimate objects of the surgeon's attention.

Definition.—Hemorrhage is the escape of blood from blood-carrying vessels; it is *active* or *passive*, *internal* or *external*. When the flow of blood remains beneath the surface, and is small in quantity, it is termed *extravasation*.

Active hemorrhage is when the blood flows freely and in streams, or is profuse in quantity; *passive* hemorrhage is when it flows from the capillary vessels and terminal branches, and is discharged slowly and irregularly. *Primary* hemorrhage is when it occurs during the performance of an operation; *intermediary hemorrhage* is the flow of blood that takes place a few hours after an operation; and *secondary* hemorrhage is that which occurs

some time after an injury, occasioned, it may be, by suppuration, and opening of a vessel; or it may result from the early removal of a ligature, the abstraction of pins, dressings, etc., which have been employed to prevent primary bleeding.

Hæmophilia.—The hemorrhagic diathesis is a peculiar constitutional defect, which seems to consist in a want of contractility of the arteries, and of coagulability of the blood; so that the slightest wound bleeds almost uncontrollably, and life may be lost through the most trifling injury or surgical operation. If the existence of this diathesis be ascertained, surgeons would do well to refrain from operations with the knife on the individual possessing it. In a case of congenital phimosis, in a person of this kind, which fell under Mr. Liston's care, he very judiciously employed the ligature instead of the knife. This diathesis often runs in families. Thus the history is recorded of four children who were born of healthy parents: their skins were white, and complexions fair; they were very subject to fever with ecchymosis; their blood was very fluid, but coagulated in the usual manner; violent coughing easily produced hæmoptysis or epistaxis, and any slight injury caused ecchymosis of the skin. One died at twenty months, from biting his tongue; another at eight years, from general mucous hemorrhage; and a third at twelve, from epistaxis.

The Sources of Hemorrhage.—The *arterial*, *venous*, and *capillary* forms of hemorrhage are readily distinguished from each other by observing, that when an artery is wounded the blood escapes in jets, synchronous with the pulsations of the heart, and is of a bright red color; venous blood, on the contrary, flows steadily, and is of a dark purple hue. If the bleeding proceed only from the capillaries, there will be a general oozing of red blood from the surface of the wound. In the division of a large artery, however, the blood may flow from its distal extremity, swelling out in very much the same manner as from a vein: its true source, in this instance, is to be determined by its color. On the other hand, venous blood may be given forth in jets, owing to the vein being placed immediately over an artery, and having the pulsations of the latter communicated to it; and here the dark color of the blood will disclose its source. As a general rule, it may be remarked that no fears need be entertained con-

cerning the division of the capillaries, or of veins of medium size; as the spontaneous coagulation of the blood is sufficient to prevent any serious loss.

Natural Hæmostatics.

Arterial hemorrhage may be arrested without surgical interference: 1. By the patient's becoming faint; 2. By a retraction of the vessel within its sheath; 3. By its contraction; and, 4. By coagulation. The first of these conditions acts only temporarily; and, so soon as the activity of the circulation is restored, the bleeding will be likely to recur, as one form of *secondary* hemorrhage.

Artificial Hæmostatics.

I have now to consider the various methods by which hemorrhage may be artificially arrested; and among the first and simplest is placed—

Position.—Giving a part an elevated position will sometimes be sufficient to arrest the bleeding, and will always diminish the loss of blood in an operation by favoring a return of venous blood to the heart.

Cold.—Cold, by lowering the temperature of the part, exercises a degree of constriction upon the vessels, and favors coagulation, thus becoming a very effectual agent. It is simply and easily applied by dipping cloths in ice-water, or filling bladders with cold water or pounded ice, and placing them in contact with the surface. It may also be applied by saturating lint, or employing the douche, or irrigation. Evaporating lotions, as diluted alcohol, may be used with similar effect in the absence of ice.

Compression.—Compression is the more frequently employed to prevent hemorrhage during amputations, and in accidental wounds, as a temporary expedient. This is purely a mechanical means, and is accomplished either by applying the thumb or fingers over the course of the main artery at a point where a subjacent bone will afford support, or by the use of the tourniquet. If the bleeding occur from one of the extremities, the

necessary pressure should be made by placing the thumb over the artery on one side of the limb, and grasping the other side with the fingers; or both hands may be used, placing one thumb upon the other, as in the accompanying cuts.

When the arteries are so situated that it is not convenient to apply the thumb, a common door-key, well wrapped in muslin or flannel, should be employed as a substitute, by placing it over the vessel, the wards being held in the hand.

A very simple contrivance, called the *Garrote*, or *Spanish*

Fig. 105.



Fig. 106.



Windlass, is of valuable service in many cases of emergency. It can be made at a moment's notice by rolling a handkerchief into

Fig. 107.



a cord, and tying a knot in its middle, which is to be placed directly over the bleeding vessel at a point where its pulsations can be the most distinctly felt, and then carrying the tails of the cord around the limb, and knotting them near their extrem-

ities; a stick is now to be passed through the loop, and the handkerchief twisted sufficiently tight to bring the walls of the artery in apposition. (Fig. 107.)

Fig. 108.



The *tourniquet* most extensively used, and the one usually supplied in amputating cases, is that devised by the celebrated Petit, in 1718, and represented in Fig. 108. It is applied by first placing a firm roller, of medium size, over the vessel to be compressed, and then buckling the band of the tourniquet around the limb and pad, the requisite degree of pressure being obtained by turning the screw. (Fig. 109.) Another very efficient plan is to loosen the band or webbing that passes under the body of the instrument, and to place into the loop thus formed a firm roller; draw the band tight again, and buckle it around the limb, and turn the screw, the pad or roller resting on the artery.

Fig. 109.



Torsion.—This is a means of arresting hemorrhage, which is very highly recommended by French surgeons, though very seldom relied upon in this country, except in the case of small arteries. It consists in seizing the end of the vessel with a forceps, and twisting it several times upon its axis, in order to rupture the inner and middle coats.

The late Dr. G. D. Beebe, of Chicago, strongly advocated torsion of the arteries of the pedicle in ovariectomy, and is said to have returned the pedicle thus treated into the abdomen without any serious results.

The Ligature.—The Ligature, first substituted for the cautery by the distinguished French surgeon Pare, in 1552, offers the most safe and permanent means of obliterating the extremity of a severed artery that is employed. The vessel to be ligated should be drawn well out of its sheath by means of a tenaculum or forceps, and the ligature passed around it and tied firmly in the manner described on page 41.

If the artery be of considerable size, the tenaculum with which it is secured should not be removed until the knot is complete; as it cannot be done without exposing the patient to secondary hemorrhage. On closing the wound the free ends of the ligature should be brought out at the lowest point, where they will favor the escape of pus, thus preventing the formation of abscesses.

The material of which the ligature should consist was formerly a matter of great interest to surgeons, and a variety of substances were from time to time recommended by different operators, such as kid, chamois skin, buckskin, tendon of the deer, catgut, leaden wire, parchment, silk, or hemp thread. The two latter are now used almost to the entire exclusion of every other article. Care should always be taken to have whichever is employed smooth, round, strong, and well waxed.

Pressure.—Pressure, as a means of suppressing hemorrhage, may be employed, either when the ligature is deemed unnecessary, or when it cannot be applied, as in the case of wounded arteries of small size situated immediately above bones,—as the temporal; or when arteries cannot be ligated; or in cases where they are so diseased that a ligature will not hold. The pressure must be confined as much as possible to the bleeding orifice, and should be effected by a graduated compress and the retentive bandage. Pressure may also be secured by means of the roller, firmly and evenly applied, beginning at the fingers or toes and mounting

upward. This process diminishes the entire circulation in the limb, and, by the assistance of position and cold, largely controls the flow of blood to the distal parts of the body.

Forced Flexion.—This is a process so simple and so easily employed that it should always be thought of in those cases where alarming hemorrhages occur in wounds of the plantar and palmar arches. Mr. Heath has reported a number of cases where forced or over flexion was employed with entire success. In wounds of the palmar arch, hemorrhage may be arrested by flexing the fore-arm upon the arm, pronating the hand, and applying a compress at the bend of the elbow; in hemorrhage from the plantar vessels, by flexing the leg on the thigh, and the thigh on the abdomen, with a compress in the popliteal space.

Acupressure.—Dr. Simpson, of Edinburgh, in 1859, called the attention of the profession to a plan of compressing the arteries by means of very sharp-pointed, slender needles, of non-oxidizable iron, headed with wax or glass; being similar to the harelip needle. Says Dr. Simpson: "In acting upon this mode, the surgeon may place the tip of the forefinger of his left hand upon the bleeding mouth of the artery which he intends to compress, and close it; holding the needle in his right hand, he passes it through the cutaneous surface of the flap, and pushes it inward till its point projects out to the extent of a few lines on the raw surface of the wound, a little to the right of and anterior to his finger-tip; he then, by the action of his right hand upon the head of the needle, turns and directs the needle so that it makes a bridge, as it were, *across* the site of the tube of the bleeding artery, immediately in front of the point of the finger with which he is shutting up its orifice; he next, either with the same forefinger of the left hand, or with the side of the end of the needle itself, compresses the locality of the bleeding arterial orifice and tube, and then pushes on the needle with his right hand so as to make it *re-enter* the surface of the wound a little to the left side of the artery; and lastly, by pressing the needle further on in this direction, its point *re-emerges* through the *cutaneous* surface of the flap; and the site of the tube of the bleeding artery is in this way left pinned down in a compressed state by the arc or bridge of steel that is passed over it. The needle thus passes through and from the skin of the flap *inward* to the raw surface of the wound; and, after bridging over the site of the artery, it passes, secondly, from the raw surface of the wound *outward*

again to and through the skin." He has thus arrested hemorrhage without leaving, after the second or third day, any foreign substance in the wound. This method, although very simple and ingenious, has not as yet superseded the use of the ligature, nor been very extensively employed by surgeons.

There are at present *three* methods of performing acupressure, as proposed by Prof. W. Pirrie, and approved by Sir James Simpson; viz., *circumclusion*, *torsocclusion*, and *retroclusion*. In the first, the pin is placed behind the artery; an elastic wire being looped over the point and twisted around the pin; the pin lying behind, and the wire in front. Torsocclusion, or the "Aberdeen method," is performed thus: The pin or needle is inserted on one side of the bleeding vessel, and its point made to emerge from the tissue a few lines from the artery. The head is then made to rotate nearly the half of a circle, and the point, passing over and close to the artery, is forced into the tissues beyond. In retroclusion, the pin passes behind the artery, after its point is made to describe the greater part of a circle.

The Carbolized Ligature.—In summing up the value of these methods, Dr. Holmes remarks, that "neither acupressure nor torsion seems to me so convenient, so safe, or so likely to promote the rapid union of the wound, as the Carbolized ligature. If a great number of vessels require to be secured, the mass of pins and wires renders acupressure very inconvenient, distending the cavity of the wound, and effectually preventing all primary union; and, when bleeding proceeds from a number of small vessels, torsion is a very tedious business, even in the hands of those most versed in it. . . . I should hardly think any one could leave a large artery after either acupressure or torsion, in a patient not under his immediate eye, with the same comfortable security that he would feel if the vessel were properly tied In London we have taken up this question with no prejudice for or against either method; and the result has been, that acupressure is, as far as I know, universally disused after a fair trial, and torsion is only practiced at a few of our hospitals."

Percutaneous Ligation.—This method of securing vessels was first introduced by Ledran, in 1720, but soon fell into disuse, till it was revived by Professor Middeldropf, of Breslau, in 1856. Since then it has been growing into repute, and numbers of cases are reported of its successful application. A curved needle, armed with silk, silver or iron wire, is entered about an inch from the

artery, and is carried beneath the vessel, and made to emerge at a point on the opposite side, equidistant from the point of entrance, including more or less of the soft tissues. A compress or roller is placed between the extremities of the ligature, which are then tied. The ligature may remain from three to seven days. It is easy of accomplishment, and safe and without danger.

Uncipression.—This method of controlling hemorrhage is employed under certain circumstances where a considerable artery is wounded, yet cannot be tied, twisted, or compressed. The operation of Professor Vanzetti consists of a pair of sharp hooks, double or single, according to circumstances, which are driven into the two sides of the wound, so as to make pressure on the bleeding point or points; and these hooks are fixed by an elastic band to a splint on which the limb rests, or to something at the side of the bed. The hooks may be attached to a chain, like the ordinary dissecting hooks, or they may be mounted on handles.

Forcipation.—M. Verneuil has employed another plan of applying compression, which "consists simply in embracing the bleeding point or points in the blades of a catch forceps or ordinary dressing forceps, tying the blades of the forceps together if necessary, and leaving them in the wound till they drop off, or until the surgeon thinks it safe to remove the instrument." In cases of obstinate hemorrhage from a concealed point, or when the tissues are too rotten to bear a ligature, the flow of blood may be stayed by passing a tenaculum under the tissues, embracing the bleeding vessel or vessels, and throwing a ligature around the mass: tie, and leave in the wound.

Carbolized Catgut Ligatures.—Mr. Lister has employed, with a great deal of success, catgut ligatures thoroughly soaked in Carbolized oil. The success of this ligature depends, "not only on the material of which the ligature is composed being one which is capable of absorption, and which dissolves without exciting suppuration,—though this is an essential condition,—but also, and perhaps even more, on the rapid union by the first intention of all parts of the wound which are in contact with the tied vessel." The catgut should be saturated in the following mixture; viz., Carbolic acid, ʒi.; Olive oil, ʒv.; water, ʒiij. This method of controlling hemorrhage, I have employed in many operations with uniform success, especially in the removal of tumors, resections, amputations, and in tying the pedicle of ovarian tumors.

Styptics.—These agents may be used in the solid form, in solution, or in powder; but should only be employed in cases where the ligature cannot be applied, as in bleeding from the cancellated structure of bone, from the fauces, vagina, rectum, or in case of oozing from a general surface. In the above-named instances, however, they may become very serviceable. Formerly, surgeons used them very frequently and with confidence, notwithstanding they possess the serious objection of so changing the injured surface by their action that the subsequent process of healing is materially interfered with.* The more important of these agents include Nitrate of Silver, Sulphate of Copper and of Zinc, Alum, Tannic acid, Tincture of the Chloride of Iron, Matico leaves, Rhatany, Turpentine, Collodion, and Creosote. The Perchloride of Iron, three parts to one hundred parts of distilled water, has been recommended as a hæmostatic. It is applied by having lint well saturated with the solution and laid on the bleeding part, with slight pressure. Caution must be exercised, as it is quite *caustic*.

The Persulphate of Iron (Monsel's salt), first recommended by M. Monsel, of Bordeaux, has proved very efficient, and is in most cases to be preferred. Its application occasions no pain, and it very rapidly forms with the blood a perfectly insoluble clot, which continues to enlarge for several hours, and eventually becomes quite firm. It can be conveniently applied in solution, as it speedily dissolves in water.

Xylo-Styptic Ether Spray.—This agent, recently brought to the notice of the profession by Dr. Richardson, consists of a solution of absolute Ether, charged to saturation at a low temperature with Tannin, and afterward with Xyloidine. It is applied to the bleeding part by directing the fluid in a very fine spray, by means of the same instrument employed for inducing local anæsthesia, as described on page 119. The styptic character of the compound was first tested by dispersing it over a mass of defibrinated blood, which became completely solidified in five seconds; while in its application to blood recently drawn and

* The exposure of the bleeding surface to the atmosphere, as taught by Mr. Skey and others years ago, is one of the best of Styptics; it should not be forgotten by the surgeon that less blood is wasted by him who pushes through the operation, as a rule, without stopping to tie every vessel, than with the timid surgeon who exercises continual precaution, and ties and stypticizes every artery.

containing its fibrine, the coagulation occurred in one second. I have several times made a practical application of this novel agent with the most gratifying result; and it appears, from the experiments made by its discoverer, that it cannot only be employed with the most happy effect in the case of open wounds, but also to hemorrhages of the uterus. The instantaneous action of this agent, and the comparative simplicity and readiness of its application, will undoubtedly insure its becoming of valuable service in Homœopathic therapeutics.

Cautery.—The actual cautery is so seldom resorted to that it hardly merits notice. It is employed by applying to the part a heated iron, which, however, should not be carried to even a *red heat*; otherwise, an eschar will be likely to form, which, upon separating, would probably occasion secondary hemorrhage. A cautery obtained from the galvanic current has been recommended as a substitute for the hot iron, as the degree of heat can be exactly regulated to suit the case; it also presents a much less formidable appearance to the patient.

This barbarous relic of a past heroic surgery, has almost ceased to be used, even by its most tenacious adherents; and as an agent of therapeutic value has long since passed away into the oblivion of forgetfulness. Its only justifiable use at present is to control the hemorrhage of a bleeding vessel that is beyond the reach of the ligature. I have employed it twice in operations about the face, such as resections of the superior and inferior maxillaries, for retraction of the arteries within the bony canals. In such cases, even, it has been largely superseded by the galvano or thermo cautery.

Treatment of Epistaxis.—In *epistaxis*, occurring in persons of a hemorrhagic diathesis, it sometimes becomes necessary to plug the nostrils,—entirely closing the anterior and posterior nares,—which may be accomplished as follows: Double a piece of wire upon itself, and introduce the folded end along the floor of the nostril from before backward, until it appears in the back part of the mouth; seizing it with the fingers or a forceps, draw it out sufficiently far to enable you to pass a cord through the loop; the wire is then to be withdrawn from the nose, bringing one end of the cord with it, the other projecting from the mouth (Fig. 110); to the latter attach a pledget of lint, which is to be drawn into the posterior nares by making traction on the end of

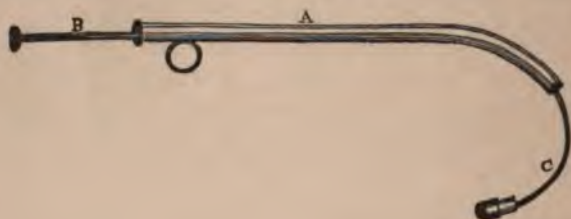
the cord passing along the floor of the nostril; then fill the anterior nares with lint, and allow the plugs to remain two or three days, according to the severity of the case.

Fig. 110.



An instrument designed especially for this purpose, has been devised by M. Belloc (Fig. 111.) It consists of a silver canula A, resembling a small catheter; through this is passed a slender

Fig. 111.



rod of silver, B, to the extremity of which is attached a piece of watch-spring, C, that terminates in a rounded head, with a hole through it for the insertion of a cord.

To introduce it, first draw the watch-spring entirely within the canula, then pass the tube into the nostril, with its curve presenting downward, till it reaches the posterior orifice, when the watch-spring is to be pushed out into the mouth; draw the head forward, and pass a cord through the hole designed to carry

it; the spring is now to be redrawn into the tube, and the latter carefully removed.

Remedial Hæmostatics.*—There are cases of *arterial-venous* hemorrhage that are entirely controlled by internal remedies homœopathically employed; such as passive flows after important operations, oozings from wounds, and vicarious and other hemorrhages from various portions of the body.

EPITOME OF TREATMENT.

Aconite.—This remedy differs from every other in its mental symptoms, restless anxiety, etc., following *arterial* hemorrhages.

Aletris.—Passive hemorrhages, with atony of the system; muscular debility.

Alum. either in powder or solution. *Benzoic acid* and *Ratanhy* are often used.

Arnica.—Injuries; fatigue, hot head and cool body; capillary oozing.

Belladonna.—Passive hemorrhages; bloodshot and perverted, congested eyes; throbbing carotids.

China.—Arterial flow; weak, frequent pulse; ringing of the ears; cold, clammy skin; vertigo; bluish face and countenance; great prostration.

Crocus.—Passive venous hemorrhage, blood forming into long, dark strings, after operations on rectum and anal region.

Erigeron.—In passive hemorrhages after operation upon uterus and vesico-vaginal fistula; rupture of the perinæum.

Ferrum.—In arterial hemorrhage; great vascular excitement, vertigo, red face, full pulse.

Hamamelis.—Passive venous flow, with atonic condition; varicose degeneration.

Ipecac.—Continuous flow of arterial blood; nausea, chilliness, hot head with debility; *gasping for breath*; constant desire to lie down.

Kali Carb.—Mixed hemorrhages, attended with sharp, cutting pains, with anxiety and despondency.

Kreosote.—Venous hemorrhages in large quantities; fetor.

Mercurius.—Passive hemorrhages, especially in females after the climacteric period; in light-haired persons, with lax muscle and skin.

Nitric Acid.—Venous flows after operation on or about the rectum; hæmorrhoidal tumors, in dark-haired persons, with tight muscle.

Opium.—For hemorrhages in “newly opened wounds;” *Cantharides* and *Phosphorus* in bleeding from various parts.

* The *natural hæmostatics* of a cut artery are (1) *contraction*; (2) *retraction*, especially of the internal coat; (3) formation of an external and internal coagulum, which extends up as far as the first collateral branch: finally, after the flow is suppressed, this portion of the artery becomes converted into a ligamentous cord, and the clot is removed by absorption.

Phosphorus. — Mixed hemorrhages from small wounds; profuse flow, in tall and slim persons, with black hair.

Platina. — Venous flows, with great sensitiveness; coagulates in a black mass; sensation as if the body was swelling in every direction.

Pulsatilla. — Passive hemorrhage, with intermittent flow, blood soon becomes black and lumpy; tearful and gentle disposition.

Sabina. — Arterial flow, with considerable pain; great debility; pain in head.

Secale. — Venous hemorrhage, in feeble, cachectic persons; flow increased by movement of the body; convulsive jerkings; general coldness; dislikes being covered.

Sepia. — Mixed hemorrhage, with sensation of heaviness in the part from which the blood flows.

Sulphur. — Sensation of heat in the part from which the blood flows; flushes of heat, with weak and fainting spells.

Tannin and *Elizir of Vitriol* in profuse arterial hemorrhages from the tonsils and other parts.

Veratrum vir. — In active arterial hemorrhage, after operation (secondary).

Monsel's Styptic. — From twenty to thirty drops, in half a glass of water, a tablespoonful every half-hour, will arrest an oozing from the medullary canal after a resection of the humerus. (Helmuth.)

Intercurrent Remedies. — These are *Arsenicum*, *Alnus rubra*, *Nuxvomica*, *Phytolacca*, *Apocynum can.*, *Erechthites hier.*, *Iris triph.*, *Diadema*, *Caulophyllum*, *Calcarea carb.*, *Cantharides*, *Chamomilla*, *Lycopodium*, *Argentum nit.*, *Carbo veg.*, *Hyoscyamus*, *Lachesis*.

Lister's Antiseptic Treatment of Wounds. — The antiseptic method of Professor Lister for the treatment of wounds has established a position which is deserving of attention. The germ theory, upon which his practice is based, is certainly not yet satisfactorily established, although there can be no question of the good results that have followed this method of treatment; and I hold it to be the duty of every surgeon to give a patient the benefit of one of the most important resources of our art. By this method, suppuration is greatly diminished, union hastened, the risk of constitutional infection lessened, and the surroundings of the patient rendered less prejudicial to health. The most scrupulous regard to details is required in all cases. The Carbolic acid should be of the purest quality. The strength in which it is employed is one part of the acid to forty parts of clear water. It is used in *three* ways: first, as a liquid or bath for instruments and sponges; second, as a spray, to impregnate the air about a wound, and to moisten the wound itself; and third, as one of the components of a mixture, consisting of Carbolic acid one part, resin five parts, and paraffine seven parts, in which the resin

serves as a vehicle for the acid, while paraffine is added to prevent inconvenient adhesiveness. "This dressing, while it absorbs discharge, holds the antiseptic securely lodged in its fibers, where it is retained by the insoluble resin; and it is to this circumstance that it owes its superiority over most other porous applications. Saturate the gauze by melting the mixture in a trough heated by steam, dip the cloth into the liquid, and then pass it between rollers, so as to press out all redundant material. The same end may be attained by *compressing* the layers of the gauze. Added thereto, a steam atomizer, oil silk, and Mackintosh cloth are required. The cloth may be purchased at any rubber store. The Mackintosh cloth and prepared gauze can be used over and over, the first by carefully wiping it with a sponge moistened in a suds of Carbolic acid soap; the gauze should be boiled in a strong soap-suds, dried, and again subjected to an application of the mixture as before. To treat a wound antiseptically, put in a basin of Carbolic acid water *all the instruments, sponges, drainage-tubes, etc.*, that are required for the operation. In the same bath the surgeon and assistants should wash their hands. The steam atomizer is so adjusted that the Carbolic acid spray shall play around and upon the wound, and also upon the hands of the surgeon and assistants, like a fine mist." All vessels requiring ligature should be seized by a Carbolicized tenaculum, and a Carbolicized catgut thread be thrown around them, both ends of the ligature being cut off close to the knot. After all discharges have escaped, the edges of the wound should be closely approximated, and held in position by the silver-wire interrupted suture; over the line of approximation a strip of Carbolicized silk is next laid, for the purpose of preventing the resin in the gauze from adhering to the wound; upon this, two or three layers of the antiseptic gauze should be laid, and the whole covered over with a piece of Mackintosh cloth. A few turns of a retentive roller should be passed over all for security.

"The gauze," says Lister, "is extremely useful in the form of antiseptic bandages, whether to check a tendency to retraction of the soft parts of a stump, or for securing and completing a dressing." If strapping is required, common adhesive plaster may be employed by dipping it into a hot solution of the acid for the double purpose of warming it and procuring its antiseptic properties. "It can then be applied effectively under the spray, which should always be used in changing the dressings of a

stump, till the wound has become superficial. The antiseptic atmosphere not only affords perfect security against the introduction of mischief, which it would otherwise be extremely difficult to avoid, but has the great advantage of permitting free inspection and manipulation of the stump. When the spray is intermitted, the wound must be covered with a "guard of rag" dipped in the lotion. The ends of the adhesive straps should be overlapped by the gauze, to prevent them from subsequently conducting putrefaction inwards. While discharge is free, the dressings should be changed daily; but, as it diminishes, the intervals may be increased, till, when there are merely a few minims in twenty-four hours, the gauze may be left undisturbed for a week together."

Two important processes in connection with this treatment are to be considered, "to provide for the due escape of serum, and to protect healing parts from the irritating influence of the antiseptic gauze. To accomplish the first, lay a strip of lint soaked with an oily solution of Carbolic acid, one to ten, one end hanging out as a drainer, removing it on the second day after the operation under the spray. For the second purpose, the cicatrizing part may be protected by interposing between it and the gauze a layer of oil silk, coated on both sides with copal varnish and afterwards brushed over with dextrine to enable it to become uniformly moistened when dipped into a watery solution." Immerse, and lay upon the wound, it having been previously prepared.

New Antiseptic Dressing.—Professor Lister, in a case of rodent ulcer, proposes a new antiseptic dressing, as follows: *Boracic acid*, in fine powder, one part; white wax, one part; paraffine, two parts; almond oil, two parts. The ingredients, after being mixed by melting wax and paraffine, are stirred in a warm mortar till the mass thickens, and then set aside to cool; after which the firm substance is reduced in a cold mortar, in successive portions, to a uniform soft ointment. There is still a better application for cases of this kind; namely, an ointment composed like that above described, except that, instead of one part of *Boracic acid*, it contains half the quantity of *Salicylic acid*, the antiseptic virtues of which have been quite recently discovered by Professor Holbe, of Leipsic, who has found out a method of manufacturing it cheaply. (*Homœopathic Times*.)

CHAPTER VIII.

The Closing of Wounds.

AFTER the completion of an operation, as well as in wounds occasioned by accident, the first question to engage the attention of the surgeon is, whether the treatment shall be conducted with a view to union by the first or second intention. There is, however, in this country, comparatively little variety of opinion respecting this point, it being almost the universal practice to attempt the healing of every incision by the process of adhesion, — closing the parts by granulation being an exception to the rule.

If the character of the wound be such as to afford fair reason to expect union by adhesion, it becomes a matter of the first consequence to have all foreign matter speedily removed by aid of the forceps and the fingers, or by allowing a stream of cold water to flow gently over it. The sponge should not be applied directly to the raw surface of a wound while cleansing, unless it be absolutely required. The preliminary measures having been attended to, the sides of the wound are to be approximated as perfectly as possible, by the use of adhesive strips, collodion, sutures, or bandages, employing one or more of these means. It should also be borne in mind, in the selection of the pieces to compose the dressing, that lightness and cleanliness are of great importance, conducing very materially to a speedy reparation of the part. Provided the wound is to heal by granulation, no attempt should be immediately made to bring its lips in close apposition, as they would be likely to unite before the deeper parts or granulating surfaces would adhere, thus favoring the formation of an abscess. In cleanly-cut wounds, all the arteries requiring a ligature are seen pouring out a volume of blood corresponding with their size; but in severe contusions and lacerations, caused by an explosion of gunpowder or by machinery, it is not unfrequently the case that the largest arteries project from the ragged surface of the wound, vibrating at every pulsation of the heart, yet without bleeding in the least. They should not be neglected, however,

but ligated at a point above the extremity, where their coats seem to be uninjured; otherwise, secondary hemorrhage will occur when reaction is fully established.

Sutures.—A Suture is formed by stitching the edges of a wound together with lead, silver, silk, or thread. They are applied by passing the needle through the skin, or through strips of adhesive plaster which were previously placed on the margins of the wound. They are respectively named the "wet" and the "dry suture." Of the former there are four varieties: The Interrupted, the Continued, the Quilled, and the Twisted or Harelip. Other kinds have been recommended, but are so seldom used (possessing little value) that a description of them will be omitted.

Interrupted Suture.—This should be made by the surgeon's seizing the lip of the wound nearest to him, or the most depending portion, between the thumb and forefinger of the left hand, and then passing the needle from without inward through this edge, but from within outward through the opposite flap. The needle should not be carried deeper than the thickness of the integument, and should always be passed through the skin *perpendicularly*. Tie the ends of the thread so that the knot may rest a little to one side of the line of union, to prevent the irritation which would otherwise result should it press directly upon the approximated edges of the wound. This suture, as well as all others, should be aided by the application of adhesive strips or bandages, especially if any traction be required in closing the wound, to relieve in a measure the strain upon the thread, and its tendency to produce ulceration. In the course of two or three days the stitches, if of silk, should be removed by seizing the knot with a forceps, in order to elevate it slightly, and then cutting the thread with a pair of sharp-pointed scissors. Silk or thread sutures, if allowed to remain in more than three or four days, excite inflammation and ulceration, thereby deforming the appearance of the cicatrix. Metallic sutures create little irritation, even when left in position for weeks. In applying adhesive strips between the stitches, sufficient space should be allowed to intervene, that the discharges may readily escape in case there should be any.

The Continued Suture.—This is seldom used except in wounds of the intestines, or in closing wounds made in conducting

post-mortem examinations. It is the stitch commonly employed in sewing, and is sometimes called the *glover's stitch*. The needle is passed as in making the previous suture, with the exception of crossing and recrossing the wound obliquely; whereas, in the interrupted, it is carried at right angles to the line of union.

The Quilled Suture.—This Suture is limited to those cases where the wound is very deep, the tissues being thick, as in operations on, or lacerations of, the perinæum. In making this Suture, as many needles should be armed as there are stitches to be taken. Double the thread to be employed, passing both ends through the eye of the needle; then hold the parts as before directed, and pass the needle at right angles to the line of the wound, drawing it through far enough to bring the loop made by doubling the ligature to within a short distance of the surface of the flap first pierced; proceed in like manner with each one. On removing the needle, pass a small piece of gum-elastic bougie quill or soft wood through the loops; place a similar piece on the other flap, around which are to be tied the free ends of the thread; draw the knots sufficiently firm to enable the quills to retain the surfaces of the wound in apposition. The advantage of this variety of suture is that it approximates the sides of the wound throughout its entire depth.

The Twisted or Harelip Suture.—This is chiefly used to promote adhesion between the edges of incised wounds, made where the parts are very movable, as on the face, being particularly applicable after the operation for the relief of harelip. It is made by passing a straight pin or needle, with a rotary motion, through the lowest or free edge of the wound, and as deep as is consistent with safety, the entrance and exit of the pin being favored by sustaining the parts with the left hand. After the necessary number of pins have been introduced, approximate the edges, and pass a thread around each pin in loops resembling the figure 8. (Fig. 112.) The points of the pins should be removed by means

Fig. 112.



of a pair of cutting-pliers, or covered with wax, to prevent them from injuring the skin. Silver pins, with movable steel points, were at one time quite extensively used; but there is no reason to believe that they possess any marked superiority over the more common, well-silvered pin, or the straight steel needle, recommended by Heister, or the insect pin, proposed by Dieffenbach. Dr. Dorsey, of Philadelphia, has advised the use of pieces of wire, sharpened to a point. Pins, either of silver or steel, will answer the purpose, provided they are sharp, clean, and smooth.

Esmarch's Method.—The application of the rubber bandage or roller for preventing hemorrhage, was first utilized and brought to the notice of the profession by Esmarch, although other notable surgeons have disputed priority for this method. The apparatus consists of two rubber bands, one broader and longer than the other, which are employed in the following manner: "Elevate the limb; and, if there be suppurating sinuses, place over them small wads of prepared oakum; and over these pads put on a roller bandage, beginning at the toes or the fingers, as the case may be. Then take the broad bandage, which was formerly made of elastic webbing, but now of pure gum; and, beginning at the distal extremity of the limb, put it on tightly, being sure to keep the bandage on the stretch while the turns are being made. A moderate amount of force is all that is required, and the bandage should be *slowly* put on to give the blood time to recede. After a point sufficiently far above the site of operation has been reached, this bandage may be turned two or three times around the limb, and secured by passing the extremity under the last turn. This being done two or three times, does away with the upper band. However, if the upper band is to be applied, it is put on over the turns of the first, and secured by the hooks and chain at the end. The India rubber and webbing are removed, showing the limb, blanched, pale, with a diminished temperature and modified sensibility." (Helmuth.) During the process it is well to watch the increase of the heart's action during the application of the bandage as well as when the bandage is removed. I have employed this method a number of times, and can attest to its many advantages.

Dittel's Elastic Ligature.—The ligatures are of different sizes, made of solid India rubber, *freshly made*, to prevent brittleness and breaking. In operating for fistula, I first pass the

director into the sinus ; a probe is then threaded with the ligature, which is diminished in diameter by stretching, in order to introduce it through the eye of the probe ; it is then passed along the groove of the director, and made to emerge at the internal opening of the fistula. Remove the director, and unite the two ends of the ligature, which are passed through a leaden ring, and clamped by a pair of strong forceps. The degree of tension of the ligature depends upon the length of time required to cut through the tissues. I have employed this process a number of times, and always with excellent results. It has been tried also for the removal of tumors.

CHAPTER IX.

Hypodermatism.

THE administration of remedies by hypodermic injections is accomplished by the use of a syringe having a sharp, needle-like point, which being introduced beneath the skin, a small quantity of the liquid is forced into the cellular tissue and rapidly absorbed. Some very satisfactory results have attended this procedure, especially in injuries and diseases of the nervous system. The successful treatment of several hundred cases of intermittents and other diseases have also been reported. It is necessary, however, to exercise care, in order to avoid as much as possible the occurrence of local irritation ; as otherwise the operation is liable to be followed by suppuration. In ordinary cases, it is quite probable, that making fine punctures with a needle, and applying the solution externally, will answer as well as the use of the syringe. In severe cases, resisting the internal administration of remedies, the operation may be resorted to, and is worthy of trial.

The hypodermic syringe was invented by Alexander Wood, of Edinburgh ; the idea having been derived from the instrument used by Mr. Fergusson for injecting nævi. The best way of using the instrument is to pinch up a portion of the integument between the thumb and forefinger of the left hand, and introduce the capillary point into the fold, just far enough to penetrate the

skin, and press the piston slowly home. The hypodermic syringe has been improved in various ways from time to time; but the one constructed by Messrs. Tiemann & Co., of New York, with the cylinder made of glass, and graduated so as to regulate the number of drops to be used, is the best for all practical purposes. In preparing the hypodermic mixture, it should be remembered that *not more than one-half the dose* administered by the mouth should be used, and it is safer to begin even with a smaller dose in most cases. If the materials are soluble in water, that is the best vehicle to be used, it being less irritating to the skin than other substances. The following table, from Helmuth's Surgery, shows the doses to be employed :

Muriate of Morphine	$\frac{1}{8}$ to $\frac{3}{4}$ of a grain.
Sulphate of Morphia	" " " " "
Atropine Sulphate.....	1-60 " 1-30 " "
Strychnine	" " " " "
Sulph-Soda (Hewson)	ij. grains.
Sulphate of Quinine	" " to 4 grains.
Squibb's liquor of Opium.....	v. gtt. to xl. gtt.
Magendie's solution.....	ijj. gtt. " xx. "
Tinct. Hyoscyamus.....	x. " " xx. "
Tinct. Cannabis	x. " " xx. "

CHAPTER X.

Aspiration.

FROM remote ages, physicians and surgeons have employed instruments termed *pyulea* for exhausting deep-seated abscesses, and withdrawing the contents of cavities within the body. Dieulafoy, in 1859, devised and perfected the "Aspirator," which has been largely used by the profession in evacuating fluids, such as the contents of hydatid cysts of the liver; in cases of spina bifida, hydrocephalus, ovarian cysts, abscess of the liver, retention of urine, poisons in the stomach; of effusions into the pericardium, pleura, articulations, peritoneum, tunica vaginalis; and in strangulated hernia, acute abscesses, suppurating buboes, sanguineous effusions, and various other diseases.

As an agent for determining diagnosis of doubtful disorders, the aspirator must hold an important position: the facility with

which the operation is performed, and the freedom from dangerous results, greatly add to its general use. Tiemann & Co., of New York, have designed two varieties of this instrument, for removing both small and large quantities of fluid, which should enter into the armamentaria of every practicing physician. To use the instrument properly, first create the vacuum, insert the needles into the part desired, turn the stop-cock, and the fluid will be drawn into the glass cylinder. Emmett's Aspirator (Fig. 113) is a valuable instrument; also the one modified by Dr. Simon Fitch (Fig. 114), a description of which, taken from Messrs. Tiemann & Co.'s Catalogue, is here given :

Fig. 113.

"Mr. Fitch has had the distal orifice of the inner canula closed over by a rounded or dome-shaped roof, so that, when it is projected beyond the cutting point of the outer canula, the two tubes fit closely together, and the end of the combined instrument feels perfectly smooth, like the end of a sound or catheter, and may be freely moved within the cavity penetrated, as the ovarian cyst, the abdomen, the thorax, the bladder, or even the pericardium, without danger of wounding any viscus or organ, puncturing any vessel, or even scratching or abrading the lining of the cavity, or of any parts contained therein. The base of this dome being of the same external circumference as the inner tube, of which it is the continuation, and fitting the outer tube accurately, when the point of the instrument enters a cavity there can be no escape of fluid till the dome is advanced, occluding the cutting point of the outer



tube; then there is disclosed a fenestra, or oval aperture, on the *under side* of the inner tube, cut out of the lower wall and one-third of each side wall, of the full size of the bore of the tube, and by which the fluid may be freely evacuated.

"In the ovarian trocar, and in the trocar for paracentesis abdominis, a curved metallic tube, fitting upon the proximal end of the outer canula, serves as a handle, and directs the current downward, and one end of an India-rubber tube may be drawn over the lower orifice of this curved hollow handle to conduct the liquid into a receiving vessel. The middle of this tube is expanded into a bulb, by which the flow through the tube may be promoted or hastened, and the cavity more rapidly and perfectly exhausted, or washed out, or injected.

"The wooden ring with Wells's grapples may be slipped upon the instrument; or light, long clamp forceps, with numerous teeth in the broad distal ends, may be held in hand, or attached to the instrument by a sliding ring, narrower than Wells's, or by a shifting ratchet.

Fig. 114.



"Dr. Fitch feels assured that the operations of *transfusion* and *aspiration* can also be performed with this instrument with great ease and safety.

"A trocar of suitable size having been attached to each end of an India-rubber tube a foot long, with the middle expanded into a bulb, one of the trocars is inserted into the vein which is to furnish the blood, and,

when the apparatus is filled, the other trocar is introduced into the receiving vein, and the operation is completed.

"As soon as the lancet-end of the outer tube is inserted, the dome is projected from the interior, and the tubes, thus guarded, may be safely pushed as far as required, downward into the furnishing vein, and upward into the receiving vein, and no ligature will be needed. Thus time, so valuable in this operation, is saved, disturbance of the vein is avoided, and injury to the interior of the vein need not be feared.

"The attachment to the Aspirator is effected instantaneously, and without moving either the trocar or the Aspirator, by pushing the conical end of the Aspirator nozzle into the funnel-shaped proximal end of the inner tube, and tightening and fixing it by one turn of the ring-nut like a hose-coupling.

"A recess in the end of the tubular handle holds an India-rubber washer, which, fitting closely around the inner or dome canula, makes it continually air-tight, and sufficient for all requirements in ovariectomy, or in abdominal tapping.

"But, should absolute imperviousness be desired for perfect exhaustion, or for injection of a cavity, the handle may be reversed, the smaller end screwed upon the proximal end of the inner canula, and the orifice of the India-rubber tube drawn over the larger end of the handle, after pushing back the loose ferrule so as to expose this end of the handle.

"Or the *aspirator* may be attached to the inner tube, either directly or with the intervention of the handle. The instrument as at first made had the handle continuous with the inner canula, and the thumb-rest upon the outer tube; but it is not so easily worked with one hand as in the present arrangement.

"The bulb is a *simple expansion of the tube*, so as not to interrupt the easy flow of fluid, or to whip the blood in transfusion, as might occur were the bulb connected by any sort of joint with the tubes, between which it is placed.

"This bulbous tube may be used for the ordinary emptying or washing out of cavities, or for aiding the current from vein to vein in direct transfusion, or for quickening the flow from the elevated reservoirs in mediate transfusion, if it seem sluggish. The *drawing on* of the India-rubber tube may be facilitated by smearing the end of the handle or nozzle with soap and water, or with oil.

"The instruments may be of any size. The largest is the *ovarian trocar*, which has a total length of twelve inches, the handle being four inches, and the inner canula, besides the portion within the handle, eight inches, with an internal diameter of half an inch. Dr. Washington L. Atlee used this in his last ovariectomy, and expresses unqualified approval of it.

"That for *paracentesis abdominis* is exactly half the size of the ovarian trocar.

"The smallest sizes correspond in caliber with Dieulafoy's aspirator needles, but are longer, being five and one-half to eight inches in length, for exploratory sounding, for emptying deep cavities, and for transfusion."

CHAPTER XI.

Transfusion.

THE principle of introducing blood of the strong and vigorous into the depressed and broken-down constitutions of the weak and sickly, for the restoration of health and the preservation of life, is by no means a recent procedure. In the latter part of the fifteenth century it had attracted a great deal of attention in Europe, and has challenged the research of medical men, more or less, from that to the present time. Prior to 1665, transfusion was wholly performed upon the brute creation, and was mainly instigated through curiosity, or a desire to delve into the hidden mysteries of the animal economy; hence, as a medium of relief for human suffering, it was clothed with ideas vague, and hypotheses fanciful. Step by step it advanced, under the experimentation and investigation of such distinguished physicians and scientists as Wren, of England, Folli, of France, and Rina, of Italy, till it occupied an important position as a remedial agent in the great world of medical knowledge.

In the beginning of the nineteenth century the substitution of direct transfusion from man to man was entertained by some eminent surgeons, who placed in this method of using human blood confident hopes of superior advantages as compared with the earlier procedures. Rosa, of Italy; Blundell, of England; Nelaton, of France; Dieffenbach, of Germany; and, later still, the celebrated physician and scientist, Moncoq, of France,—have established the principle on a more intelligent and scientific basis than ever before existed. Following up the principle from the position where these distinguished physicians left it, I have experienced some of the most gratifying results from its use. The benefits derived from the operation depend, in a large degree,

upon the time and care given in its performance. The operation is performed in the following manner :

Fig. 115.



The blood of the donor is taken from the *vein* of the *right* arm, from the circumstance that exercise renders these veins larger and more dilatable than those of the left, and also from the fact that venous blood coagulates slower than arterial, is in more harmony with the vital current, and consequently less disposed to produce injurious results. The healthy, fresh blood introduced into the vein, mingling with the diseased or perverted blood of the patient, flows on its way to the heart: from thence passing through the lungs, it is transformed into a better and more healthy fluid, bearing with its tide the revivifying virtues of arterial blood. The subject upon whom transfusion is to be performed should be placed horizontally in bed, on the back, the head on a line with the body, the arm to be transfused making a right angle with the body, and placed in a horizontal position. The operator, seated on a level with the bed of the patient, should possess every facility for easy motion of his hands, one of which, holding the hæmatophore, is placed upon a firm table at a suitable distance from the right elbows of the donor and patient.

He requires two assistants, one of whom holds the canula after it has been introduced into the vein of the patient, and retains it in position, for the purpose of excluding air, and at the same time to control the patient's pulse. At the beginning of the operation the pulse generally falls, but rises again after an ounce or two has been introduced, the frequency and character of the pulse determining the quantity of blood to be transfused. The other assistant is to take charge of the bleeding vein of the donor, who should be seated at the operator's left, and furnishes the hæmatophore with the amount of blood required for the transfu-

sion. Before throwing the blood into the vein, the hæmatophore should be dipped in warm water, every particle of air excluded, and the blood sucked into the cylinder by aspiration; from thence it is thrown into the patient's vein, the hæmatophore acting the part of an intermediate crystal heart.

The success I have met with in this brilliant operation (having performed it twenty-seven times), I believe to be largely dependent upon the precise and methodical manipulation of all the movements referred to. It has been employed in cases of excessive hemorrhage, anæmia, chlorosis, leucocythæmia, cholera, rachitis, scrofula, asphyxia, hydrophobia, chronic rheumatism, poisoning by gases, etc. In a few cases I have withdrawn a portion of the diseased blood before I instituted the transfusion. In a large majority of cases, improvement marked the introduction of the fresh blood almost immediately. In the case of General Francis P. Blair, Jr., the distinguished statesman and intrepid warrior, I performed the operation a number of times; and, I believe, had it not been for the unlooked-for and unfortunate accident which terminated his life, ultimate recovery would have taken place. The following extract from the *Globe-Democrat*, a newspaper printed at the time in St. Louis, will show the improvements inaugurated in his case. "The first operation performed in this city has met with more than anticipated success, and it will be interesting to the public to know, that under this treatment, General Blair is steadily improving. Dr. Franklin will repeat the operation in about two weeks from the last one, which will be some time this week. He has been operated on already three times. The first time an ounce and a half was transfused; the second time, a little less than four ounces; and the last time, over five ounces. The first two times he lay almost insensible, and apparently unconscious. The last time he watched the operation with great interest, and articulated a few words, which he had not done before for some time. He also moved slightly his paralytic arm, and a few minutes afterward fell asleep. His wife and family are represented to be greatly encouraged."

CHAPTER XII.

Electricity and Acupuncture.

Electrolysis.—Dr. John Butler, of New York, in his article on "Electrolysis," says: "When two or more needles, connected with the poles of an apparatus generating a galvanic current of sufficient intensity to overcome the resistance of the circuit, are inserted into living animal tissue, the following results take place: viz., the blood-vessels of the part become dilated and engorged, producing intense hyperæmia, and the absorbents are stimulated to increased activity. In short applications with weak currents the effect ends here; but, should the action of the current be continued, and the tension and quantity slightly increased, the albumen of the part becomes coagulated; and, with a still stronger current, the water of the tissues becomes decomposed, the oxygen becoming attracted toward the positive pole, and the hydrogen toward the negative; to find vent at which, it bubbles violently through the intervening structures, tearing fiber of muscle; separating cells, nuclei, filaments, etc.; and mechanically destroying anything that may oppose its egress. The salts of the tissues are resolved into contained acids and alkalis, the acids forming around the positive pole, and the alkalis around the negative; when both act as powerful escharotics, producing sloughing. Thus the tissue acted upon is made to destroy itself through its own contained re-agents. The operation thus described may practically be divided into four stages:

"1. The dynamic or absorbent stage, corresponding to what is called by Remak, electro-catalysis.

"2. The coagulating stage.

"3. The stage of mechanical disintegration.

"4. The escharotic stage, or the stage of complete and ultimate electrolysis. We use the first stage only in the treatment of serous effusions, stricture, watery cysts, etc.; the second stage in the treatment of aneurism, varicose veins, hæmorrhoids,

nævus, and other diseases, where coagulation of the contained blood is desired, and when the production of a slough is not intended; the third and fourth stages in growths of a malignant nature, fibrous tumors, polypi, fatty tumors, or in any case when a total or partial destruction of the part may be necessary. In the operation, the greatest amount of effect produced is in the immediate vicinity of the needles; in very mild currents the cauterizing effect is only produced in the parts directly in contact with the needles; with strong currents the sizes of the slough depend upon the structure of the tissue, the amount of water and salts it contains, the size of the needle, and the duration of the application. The eschar produced by the positive pole differs essentially from that caused by the negative, inasmuch as the ulcer resulting from the separation of the slough of the first, leaves a cicatrix, which heals by contraction, like that produced by an acid caustic. No such results take place from the action of the negative pole: on the contrary, the cicatrix is soft and pliable.

"It is, of course, entirely impossible to obtain purely the results of any one of these stages *per se*: for instance, in Electro-puncture of an ovarian cyst, the result aimed at, is to produce absorption, and so act on the internal part of the cyst as to destroy its secreting powers, and prevent refilling. Electrolysis of the watery parts of the contents must and does take place to a greater or less degree, but it forms no part of the desired effect; and so in operating upon aneurism or nævus, though coagulation of the blood is the only thing desired. Electro-puncture, as thus described, is presumed to have been performed with needles made of unoxidizable materials. Should the needle of the positive pole be made of materials capable of being acted upon by the acids set free at this point, the results are modified in a great degree. For example, suppose the positive needle should be made of iron, the needle becomes dissolved by the acids set free, and the phosphate, sulphate, and chloride of iron are formed, principally the chloride. From this point, we would infer that iron needles would be useful when coagulation of blood is the result aimed at; and there is no doubt they assist the accomplishment of such a result to a considerable extent. Suppose we use zinc needles; we have Chloride of Zinc formed, which is a powerful escharotic, and assists materially in hastening the destruction of morbid growths. I have used these needles with a weak Galvanic cur-

rent, and long applications, for the destruction of malignant tumors, and believe it to be in many cases the most appropriate treatment. The diseased tissue is chemically dissolved by this current, which at the same time influences the morbid nervous impulse which caused the secretion of the mistaken cells in the first place; and the Electro-chemical action of the already disintegrating structure on the needle, forms, molecule by molecule, one of the most powerful escharotics, which destroys, molecule by molecule, any of the diseased mass that may possibly escape the action of the current; and not only that, but it acts as a powerful antiseptic on the slough, that otherwise might become offensive before separation. The other advantage of the operation is, that it is comparatively painless; in some cases, entirely so. Electrolysis of the tissue takes place so slowly that the Chloride of Zinc is also formed slowly; and, immediately uniting with the tissue that is already half numbed by the action of the current, very little if any pain is produced. In fact, the strength of the current can be so arranged that no pain is caused. In my opinion, the Electro-chemical treatment far surpasses ordinary Electrolysis in certain cases, where, when total destruction of the part in as short a time as possible and with a minimum amount of pain, is desired, still, a slight eschar around the uninsulated part of the needle is unavoidable. In such operation it behooves us to make this latter as light as possible, which can be done by diminishing the amount of quantity of current used; that is to say, in any operation requiring a cauterizing effect, a large quantity is required; in operations where we simply desire to produce the absorbent or Electrocatalytic effect, we require tension, but small quantity.

"We will, for the present, dismiss this question of Electro-chemical treatment, and return once more to the consideration of the effects of the current as applied with unoxidizable material.

"This operation, so far, we have only considered as performed by the use of needles introduced into tissues. The same effects, in a lesser degree, can be obtained by external application of metallic and other rheophores to the skin, mucous membrane, or denuded tissue. And, when we use the current for the sake of its lesser effects, it is frequently applied in this manner. One of the greatest difficulties in the technics, so called, to the tyro Electro-therapeutist, is to avoid doing too much. The operator must have a battery prepared with a Brenner's or other equally accurate

rheostat, constant and reliable, capable of giving every variation of quantity and intensity of current. He must be quite familiar with its action, and with the effect each variation is capable of producing on living animal tissue. He must also be able to control the Electro-motive force to the exact point capable of producing the effect desired, and no more. For instance, what could be more deplorable than that sloughing of the urethra should take place, when the effect intended to be produced is merely the absorption of a stricture? or, in operating on a *nævus* on the face of a young lady, that an eschar should be caused, when we merely aim at coagulation of the morbid growth? And yet the slightest overstepping of a scarcely defined boundary will cause just such a result. Better far to do too little than too much. It is impossible to state with precision the exact quantity and intensity of current to be used; as that depends on the size of the growth, the density, and the amount of watery and saline ingredients contained. This must be learned entirely by experience."

Dr. Butler has opened a new road to the cure of many diseases by the use of this important remedial agent; and the success attending his various operations has shown the true value of this agent in skilled hands. He has employed it successfully in stricture of the urethra and of the *œsophagus*; *nævus maternus*, hæmorrhoids, aneurism, varicose veins, malignant, fibrous, adenoid, and cystic tumors, etc. For a full knowledge of the treatment of these various disorders and the manipulations required, the reader is referred to his excellent treatise, entitled a "Text-Book on Electro-Therapeutics and Electro-Surgery."

Galvano-Puncture.—In this operation the needles are passed through the skin as far as desired, in the same manner as in acupuncturation, and the Electric fluid conveyed to the affected part by bringing the poles of an Electro-magnetic machine in direct contact with the head of the needle. Care should be exercised not to make the current so severe and continuous as to heat the needles, and thus convert them into actual cauteries. The best method in these cases is to insert two needles deeply at two points in the course of the nerve, and to pass a Galvanic current through them.

I performed this operation in a well-marked case of ovarian tumor (unilocular), in a young lady in Missouri, where the cyst had attained the size of a large orange, with the most satisfactory

results. The tumor became gradually hard and dense, and in three weeks nothing could be felt of the growth. I believe it to be a very valuable agent in curing fluid cystic tumors.

This procedure will sometimes be found serviceable in *paralysis, rheumatism, deafness, amaurosis, neuralgia, etc.*

Electricity and Galvanism.—Electricity and Galvanism are beneficial in certain cases of defective circulation and nervous influence; when the parts are weakened and benumbed after acute nervous diseases; in cases of atrophy of the extremities after fever; when the extensors are paralyzed from long disuse, as after diseases of joints; in deficient menstruation; in loss of voice from relaxation of the mucous membrane of the fauces, and in hysterical neuralgia. But the cases to which they are peculiarly applicable are those of asphyxia from poisoning, hanging, or drowning, when the affusion of cold water and other stimulants fail to excite the action of respiration. The best method in these cases is to place one wire in front of the neck, and the other at the pit of the stomach; or, if the sensibility is so feeble that this fails to take effect, a needle may be inserted deeply between the eighth or ninth ribs on either side, so as to reach the diaphragm, and the current be passed between them.

Acupuncture.—This consists in making punctures through the tissues by the introduction of delicate needles, which may be either of gold, silver, platina, or steel. The manner of performing the operation is simply to support the needle with the thumb and forefinger of the left hand, while with the thumb and forefinger of the other hand it is made rapidly to rotate until the point has penetrated to the required depth. Several may be introduced in like manner at short distances from each other. The most marked benefit has been ascribed to their use in particular cases, accompanied by intense pain, as for example in neuralgia; though the success attending their application has not been so constant as to bring the operation into very general favor. It has been employed by Dr. Lanyin in the palliative treatment of hydrocele; a common needle of a large size having been introduced into the sac, has invariably caused the removal of the fluid, after an interval of twenty-four hours, with so little suffering that I recommend it in all cases where mere palliation is required. The author employed it in several cases of *nævus* with excellent results.

Galvano-Cautery Battery.—This valuable application of Electricity is being largely employed by surgeons in the removal of tumors upon the surface of the body, as well as in the accessible cavities. The author removed a large *nævus* from the forehead by a platina wire heated to a white heat, and applied to the base of the tumor. The growth was completely destroyed; and the eschar separated on the tenth day, leaving behind a perfect cicatrization. A lupus tumor of the nose was also removed by the same means; and I endeavored to cut off a huge fibroid tumor within the nasal cavity by the heated platinum wire, but failed in consequence of not having the proper instruments. Dr. Neftel has applied the process to the removal of cancerous tumors, with success.

CHAPTER XIII.

Disinfectants and Antiseptics.

BESIDES the ordinary and well-known contagious or infectious diseases, there are conditions of the system undoubtedly brought on by some atmospheric change, and which eventually become developed into affections of a specific character. This is the more especially to be noticed in large and crowded hospitals, and where the temperature of the air is exceedingly variable. Dysentery and erysipelas are particularly liable to be thus propagated; and, where a large number of patients are collected together, there is frequently a tendency to the occurrence of phagedæna; every sore becoming gangrenous, and new ones of like character breaking out. In order to successfully combat these atmospheric influences, recourse is had to proper ventilation and disinfectants.

That disinfection may be performed properly, cause and effect must be considered: substances that are employed to prevent the former are termed *antiseptics*; agents that neutralize the latter are called *deodorizers*. The rendering of the atmosphere more pleasant to our olfactories is no evidence that the disease-producing germs, ferments, or sporules are removed. The disagreeable odor may be even less hurtful to our systems than the

more pleasant atmosphere made so by the deodorizers used. A true antiseptic, therefore, must contain within itself, not only the power to prevent disagreeable odors from being perceptible to our senses, but to destroy the germs or cause upon which the odor depends. Disinfectants may be classed into antiseptics and absorbents,—the *former* preventing decomposition, or so changing it by chemical union as not to be injurious to health; the *latter* absorbing or neutralizing the volatile or gaseous products of decomposition, to prevent the injurious influences from affecting our organisms.

Earth; Smoke from a wood fire; Oakum soaked in tar, lighted, and allowed to smother; Heat; Coffee; Bromine; Ozone; Iodine; Nitrate of Lead; Chlorine; Zinci Chloridi liquor; Calcis Chlorinate liquor; Labarraque's solution; Permanganate of Potash; and Nitrous fumigation,—are the important disinfectants.

Tar acids, Creosote, and Carbolic acids, Chloride of Aluminum, or Chloralum, Thymol, and Potassa fusa, are reckoned as the most important and valuable of our true antiseptics. The preparation of the most important of these is annexed.

The apartment occupied by the patient should be subjected to the most effective measures for frequently renewing the vitiated air by the introduction of that which is fresh and clear. When the weather is such as to admit of keeping a fire in the room, much of the noxious atmosphere will ascend through the chimney. When, however, circumstances will not admit of employing ventilation or the advantages of a fire sufficiently to answer the purpose, recourse must be had to one of the disinfectants or antiseptics recommended as a means of purification.

The Chloride of Lime.—This may be used in a solid state by having it placed in various parts of the room, and moistened with water, or, what will give a greater decomposing power, diluted sulphuric acid.

The Chlorides of Potash and Soda.—These Chlorides can be rendered effective in the same manner. If, however, it be desired to use the former (Chloride of Lime) as a liquid, the necessary preparation can be made by introducing into a common glass retort fourteen parts of the black oxide of manganese, six parts of the chloride of soda, the same proportion of sulphuric acid, and twelve parts of water. From this combination, Chlorine gas will be set free without the application of heat; it is then

transmitted through a tube attached to the neck of the retort, and also to the bottom of a similar vessel filled with a saturated solution of lime. After the evolution ceases, the solution thus impregnated should be diluted with about forty parts of fresh water. This liquid is to be sprinkled on the patient's clothes and bedding, and a portion may sometimes be added in washing a diseased part.

The Chloride of Zinc.—The Chloride of Zinc in solution, "Burnett's disinfecting fluid," is also used; or *common salt* may be substituted by pouring concentrated sulphuric acid upon it in proportion of one part of the latter to three of salt. The objection to the use of the Chlorides arises from the odor, which to some persons is very disagreeable.

The Binoxide of Manganese.—Mixed with nearly an equal amount of common salt, and then ground into a powder, this becomes a very effective agent by pouring diluted sulphuric acid upon it.

Nitrous Acid Fumes.—The fumes obtained by heating the nitrate of lead, or by the action of sulphuric acid on nitrate of potash, in equal proportions, have been highly recommended; though care must be exercised in the use of this compound, as well as in those previously named, lest the gas be disengaged too rapidly.

Carbon.—This element is used in a variety of forms. As *Smoke*, it is sometimes employed to purify vessels or houses in which infectious diseases have prevailed. *Charcoal*, finely powdered, will often entirely correct the fetor of foul ulcers, gangrenous sores, etc., by its application as a poultice. *Coal Tar*, *Creosote*, and *Oakum* are also effective in arresting the decomposition of animal or vegetable substances.

Sulphuric Acid.—Owing to its power of promptly decomposing sulphureted hydrogen and ammoniacal vapors, Sulphuric acid is undoubtedly the most effective agent for correcting the odor arising from faecal discharges.

Copperas.—Copperas, containing the same acid, employed in the form of a strong solution in water, is very efficient, and can be more safely handled.

Sulphurous Acid Vapor.—This vapor, obtained by burning sulphur or brimstone, has a marked tendency to prevent or arrest fermentation and putrefaction, and is used for the same purpose.

Sulphate of Iron, Etc.—Sulphate of Iron, and, in short, all soluble metallic salts that possess an acid reaction, are employed with success as disinfectants.

Iodine (in Tincture).—This is also highly recommended for the deodorization and disinfection of fluid and semi-fluid substances.

Heat (212° Fahr.)—This is the only reliable agent for effecting the complete deodorization and disinfection of articles of clothing.

Ozone.—Dr. T. Herbert Baker, in an essay written upon this subject, gives this agent the preference for its steady and continuous effect, both as a disinfectant and deodorizer, "by resolving and decomposing into primitive and innoxious forms the deleterious matters." I believe it to be inferior in point of its antiseptic properties to both Chlorine and Bromine.

Ozone can be readily furnished by placing a stick of phosphorus in a cup filled with water, permitting an end of the stick to protrude beyond the surface of the water. Excess of Ozone is hurtful; it is therefore suggested that the generating-cup should be removed at night for several hours.

Chlorine.—Chlorine, discovered by Scheele, in 1774, is one of the best antiseptics of the present day. It is generated in several ways: first, by pouring muriatic acid on peroxide of manganese; second, by adding one part of sulphate of aluminium to one of the chloride of lime; third, by "occasionally dropping a crystal of chlorate of potash into muriatic acid." Its destructive powers are very great, and its action two-fold. "The chlorine combines with hydrogen, and thus forms new compounds; with water, it renders the water nascent, so that it is a powerful oxidizing agent, and so oxygen comes forward." The United States Army Hospital formula is thus given: Eighteen parts of common salt to fifteen parts of binoxide of manganese; mix thoroughly, and pour upon the mass a solution composed of forty-five parts of concentrated sulphuric acid and twenty-one parts of water.

Bromine.—This is an expensive, but most excellent disinfectant. Spontaneous evaporation takes place as soon as the stopper is removed from the vial containing it; but, on account of the expense in procuring it, and the difficulty in its management, it has not been received into general use.

Bromo-Chloralum.—This is one of the most important preparations in use as an antiseptic, deodorizer, and disinfectant, and, on account of its odorless and non-poisonous character, can be employed both internally and externally to fulfill the many indications presented in the care of the sick and wounded, whether in private or hospital practice. From its being so safe in its use, it can be employed by inexperienced persons without fear of any unpleasant results. Its medical properties are antiseptic, styptic, deodorizing, and disinfectant. It is a concentrated solution of aluminium, chloride and bromide; and, by its frequent use and repeated experiments, it has proved to be as efficacious as Carbolic acid, Chloride of Lime, or any of the metallic substances employed. It absorbs and neutralizes all noxious gases, vapors, or exhalations that exist in the air from whatever cause, and by direct application destroys immediately the emanations arising from fetid, corrupt, or putrid matter. It is on this account eminently useful in the dissecting-room; as, by its extreme diffusion, it permeates every portion of the room, deodorizing and purifying the air it comes in contact with. By its chemical action, it changes all deleterious and odorous gases into a harmless and non-injurious compound. To effect this, and to chemically change the air of a sick-room loaded with poisonous and unhealthy gases, it is necessary that as large a surface as possible be moistened with this agent. This is the best done by moistening a large piece of woolen cloth with the Bromo-Chloralum, one part to five or ten parts of water, and suspending it somewhere in the room, and renewing the agent from time to time. It may be diffused in a room or about the bed of a patient by one of the various atomizers now in use. It has been used, also, in cuts or scratches contracted in the dissecting-room, by applying a strong solution of the agent to the part, and keeping it constantly applied by means of a pledget saturated with the Bromo. It will neutralize the poison of insect bites, the venom of snakes, and vegetable poisons, by using constantly and thoroughly a strong solution; or, if need be, the Bromo in *full strength*. Chilblains, erysipelas, ulcers, diphtheria, small-pox, etc., have been said to be cured by its persistent and judicious employment.

CHAPTER XIV.

Catheterism.

THE term Catheter was formerly a very indefinite one, being extended so as to embrace instruments which were of an exploratory character, as well as those employed for the purpose of dilating closed or constricted passages. More recently, however, the almost universal custom has restricted the signification of the term to mean an open tube for evacuating the bladder or for injecting liquids.

They are usually made of silver or gum-elastic. When constructed of the latter material, they are necessarily destitute of fixed curve; and hence firmness is given them by introducing an iron wire along their caliber. Catheters are of different sizes, and should have two large eyes very nearly opposite each other, near their curved extremity, to admit the passage of liquids: small holes are more liable to become clogged by mucus, or other causes.

The use of the Catheter is appropriate when the walls of the bladder lose their tone, which is frequently the case in aged people; in cases of typhoid fever, injuries of the brain, etc., when the reflex actions are imperfect; in spasmodic or permanent stricture of the urethra; when the neck of the bladder is closed by an enlarged prostate; by pressure of the gravid uterus; in cases of obstruction from a small calculus; in rupture of the urethra; or when, from any reason, it is necessary to wash out the bladder.

Method of Introduction.—As a general rule, the patient should lie on his back, with his shoulders slightly elevated, his thighs semi-flexed, and knees well apart; the surgeon, placing himself on the side of the patient, exposes the head of the penis by raising it between the middle and last two fingers of the left hand, and with the thumb and finger retracts the prepuce if required (Fig. 116); then, holding the open end of the Catheter, previously warmed and oiled, in his right hand, between the

thumb and first two fingers, the concavity of the instrument looking downward, he engages its point in the orifice of the canal, the

Fig. 116.



direction of the tube corresponding with the line of flexure of the groin. Keeping the instrument in the same relative position, it is pressed down through the canal until it reaches the membranous portion of the urethra, beneath the arch of the pubis, when the handle is to be raised, and at the same time carried toward the middle line of the abdomen; after which it should be gradually carried

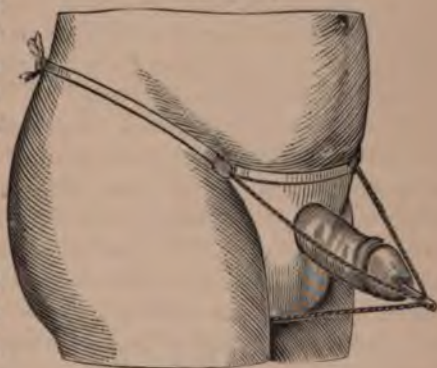
downward between the thighs. Its passage through the sphincter muscle at the neck of the bladder is generally indicated by a slight shiver, or tremor, or a sensation of nausea, on the part of the patient. The sudden escape of urine may be prevented by applying the thumb over the open end of the instrument. It may be remarked, also, that a Catheter of as large a diameter as the urethra will admit, can be more easily introduced than one of small size.

The French surgeons practice what they call *tour de maître*, which plan may be resorted to in operating upon very fleshy persons, or when the above method has failed. The patient may be in either the lying, standing, or sitting posture; the surgeon, being on the right side, passes the instrument down the urethra to the arch of the pubis, with the concavity looking downward; upon reaching this point, he gives it a turn of half a circle, so as to bring it parallel to the mesian line of the body, the concavity now looking upward; this movement, conjoined with a little pressure, generally accomplishes its entrance. There are three circumstances which determine the success of the operation: First, the resistance is overcome, the instrument slipping for-

ward a little of itself, while its handle may be readily depressed. Secondly, the vesical extremity of the instrument can be moved in any direction by rotating the handle. Thirdly, the urine escapes, which is conclusive evidence.

In Catheterism of the urethra of the female, the only difficulty is in finding the urethral orifice. This is accomplished by the surgeon's passing the forefinger of his left hand into the vulva to reach the tubercle marking the orifice, which is to be found a little below the commissure of the nymphæ. The tip of the Catheter is then passed along the forefinger into the opening, the surgeon keeping the first finger of his right hand over the other end of the instrument, until the left hand is released to be employed in placing a vessel to receive the urine. In pregnant women the bladder is drawn up as the uterus becomes enlarged, so that the orifice of the urethra is found high up behind the symphysis pubis. The handle of the female Catheter would therefore have to be greatly depressed in order to insert its other extremity. Under such circumstances it is more convenient to use the same instrument as for the male. When the bladder is greatly distended, the precaution should be observed never to draw off the whole of the urine at once, especially if the patient be at all debilitated; for it has occurred occasionally that fatal syncope has been the result. After withdrawing the greater portion, wait an hour or so, when the remainder may be removed. When it is desirable to retain a Catheter in the urethra, a silver one should be used, and may be secured by applying a double-T bandage around the pelvis, and attaching the rings of the instrument to the strips which pass between the thighs and to the belt encircling the pelvis; or, what is very convenient, take a ring of any material, large enough to surround the penis, and fasten to it the rings of the Catheter, having the ring previously secured by a belt passing around the waist, and tapes running under the perinæum. A triangular piece of muslin may be sub-

Fig. 117.



stituted for the ring, having a circular opening in its center. (Fig. 117.) Another method of securing the Bougie or Catheter is to place around the end of the penis a thin piece of fine cambric made to encircle the organ, around which is passed a rubber ring. This plan is in use at the Bellevue Hospital, in New York.

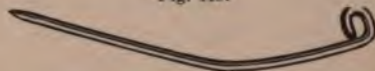
Catheterism in the Female.—In introducing the Catheter into the female bladder, the following rules should be observed: Take the Catheter in the right hand, and introduce it along the forefinger of the left hand, which rests upon the urethral orifice; it is then pushed onward gently to engage the orifice, into which it is inserted, and carried thence into the bladder. The urethral orifice is readily found, as follows: Introduce the forefinger of the left hand between the nymphæ, and pass it directly downward to the urethra, which will be recognized as a slight depression with an elevation on its vaginal aspect. A female Catheter may be retained by means similar to those just mentioned above.

Catheterism of the Lachrymal Passages.—Catheterism of the lachrymal canals, or more properly their *dilatation*, is practiced for the purpose of removing obstructions to the escape of tears along their proper excretory channels. Before resorting to the operation, however, a careful examination should be instituted to ascertain whether the affection be really a closure of the natural passages which occasions the flow of tears (*stillicidium*), or simply an excessive secretion (*epiphora*). It is very essential that the operator be thoroughly acquainted with the anatomy of the parts; for the channels along which the probe or Bougie is to pass are not a little tortuous.

If the *puncta lachrymalia* be closed, their minute orifices may first be opened with the point of a pin, or some sharp instrument, after which a probe may be introduced,—the size of the latter being gradually increased until a permanent cure of the stricture has been gained; or, if the *lachrymal canals*, leading from the puncta to the sac, are narrowed, the probe should be introduced along these passages. To dilate the superior canal, the instrument must be passed almost perpendicularly upward, inclining a little outward, then obliquely inward and downward. In operating on the lower canal, pass the probe downward, then obliquely inward and upward.

The *nasal duct*, running from the lachrymal sac to the inferior meatus of the nostril, opening below the inferior turbinated bone, may be diminished in its caliber, and thereby occasion *stillicidium lachrymarum*. Various methods have been adopted to overcome the obstruction thus produced; but the most feasible is probably that by dilatation. A series of silver probes should be prepared, four or five inches long, varying in size from No. 17 wire to No. 21, and being slightly bent,—or straight, if so preferred. One end may be turned so as to form a small loop, to enable the surgeon

Fig. 118.



to handle it more easily, while the other extremity should be slightly pointed, but not sharp. (Fig. 118.) Pass the probe through the inferior canal, in the manner already described. When it has reached the sac, the instrument should be directed almost vertically downward until it has gained the inferior meatus of the nose. The probe should be allowed to remain an hour or more, unless severe pain ensue; and at intervals of four or five days a larger-sized probe should be used, the size being gradually increased until the stricture is entirely overcome. Haste should be avoided, and care taken to allay any undue degree of inflammation that may arise.

Catheterism of the Œsophagus.—The object of this operation is to insert a tube into the stomach for the purpose of removing fluids from this organ, or of introducing them into it. The tube employed should be of gum-elastic, about two feet in length, and furnished with a flexible stilet made of a thin strip of whalebone. The extremity which enters the stomach is closed and rounded, the fluid escaping through two large eyes, placed nearly opposite each other, at this extremity of the instrument; the other end should be open and expanded, to permit the easy insertion of a syringe-pipe. In order to introduce it, let the patient be seated if possible, his head thrown well back and supported, and his mouth kept widely opened by means of a block of wood, or something similar; the surgeon, taking his position immediately in front of the patient, guides the stomach end of the tube, previously oiled and having the stilet in its cavity, toward the posterior wall of the pharynx; the stilet should now be withdrawn, to allow the tube to curve more readily as the surgeon

pushes it downward through the pharynx and œsophagus. If the patient be conscious, the brain being in a condition to respond to impressions made upon sentient surfaces, the tube will be drawn downward to the œsophagus by the contraction of the pharyngeal muscles, thereby rendering the operation comparatively simple. The entrance of the tube into the larynx will be recognized by a spasmodic cough, or by the rushing of air through the canal. After the tube has been properly introduced, fluids may be thrown through it into the stomach by means of a common syringe, or a syringe prepared expressly for this purpose. Care must be exercised that the substance injected is of a proper temperature. If the object be to remove liquid matters from the stomach, a quantity of fluid should first be introduced,—either tepid water or some liquid capable of neutralizing the noxious matter which may have been swallowed; after which the whole is to be withdrawn by means of the syringe, and the stomach thoroughly cleansed by repeated injections of water or mucilage. Patients who are unable to swallow, or who obstinately refuse to partake of food, may thus have nutritious liquids injected into the stomach for their support.

Catheterism of the Larynx and Trachea.—This is rarely practiced; but in some cases of œdema of the glottis, and similar obstructions, it may perhaps be advisable to pass a tube into the air-passages from the mouth. The operation is more difficult of execution than Catheterism of the œsophagus; sometimes, indeed, it is impossible, as when the rima glottidis is spasmodically closed. The patient being seated or recumbent, the head should be thrown back, the mouth widely opened, and the base of the tongue depressed by means of a spoon; then the surgeon, taking a silver tube curved like the ordinary Catheter for the urethra, but rather larger and open at both ends, or a stomach-tube curved by means of a stilet, passes it through the mouth directly into the larynx, the patient being directed to prolong his inspiratory act; a momentary cough may be excited by the entrance of the tube into the larynx, but this may soon subside, so that the instrument may be permitted to remain, having been secured by attaching its external end to some conveniently placed bandage, as around the neck, for example.

Catheterism of the Eustachian Tube.—The Catheter used in this operation is generally of silver, about six inches long,

the end which enters the tube, and gradually from this to the other extremity. It is open and it is of very great importance that the extremity intended to be passed into the tube should be well rounded; otherwise, contusion, and even excoriation of the membrane, will be produced. The instrument represented in Fig. 119 is there shown in its dimensions. The ring at the larger extremity of the Catheter should be in the same plane as the back of the instrument, in order that, while the catheter is being introduced, the operator, by looking at the ring, may know the direction of the point. It is to be recollected that the pharyngeal extremity of the Eustachian tube is situated at a distance of two inches and a few lines from the anterior wall of the nostril of the same side, and on a line parallel to the external wall of the inferior meatus, and about half way between the floor of the nostril and the inferior turbinated bone.

Fig. 119.



Introduction.—The patient being seated on a chair, with his head thrown a little backward and supported on a pillow, the surgeon is to stand in front of him, and, having the instrument well oiled, pass it gently along the floor of the nostril of the same side toward the soft palate; the convexity of the Catheter should be directed inward and upward, its concavity downward and outward. When the point has reached the velum palati, which will be indicated by a movement of deglutition, the shaft should be *rotated through a quarter of a circle*, so as to turn the point outward and upward to the same extent, and at the same time pushed backward a few lines, when it will have entered the expanded orifice of the tube.

CHAPTER XV.

Injections.

THIS term is applied to liquids introduced into the canals or cavities of the body by means of syringes contrived for the purpose.

Injections into the rectum are called *enemas*, *clysters*, and *lavements*, and are used to unload the large intestine of its contents, and consist of water alone, or of water holding in suspension or solution certain medicinal substances, or with the addition of a little salt, molasses, soap, or starch. Warm water, however, is generally to be preferred; though, in cases of hæmorrhoids or prolapsus ani, cold water may be substituted for its invigorating effect, but it should never be lowered below 45° F. Before using the syringe, the beak should be warmed, and lubricated with oil or lard; and should be introduced with great gentleness, to prevent any injury whatever to the coats of the intestine. The fluid should be forced from the tube gradually; and, after all has been injected, the beak should be retained a few moments in the rectum, lest the injection pass out with it. The best instrument which has been devised is that known as Davidson's, consisting of two India-rubber tubes, attached one to either side of a hollow ball of the same material; valves are so arranged at the points of attachment, that, when one end of the apparatus is placed under water, and the bulb alternately squeezed and allowed to expand, the water will be drawn through and forced out at the other end. The patient will be most conveniently placed in the recumbent posture.

The coco butter suppositories are sometimes employed by Homœopathic practitioners as a vehicle to carry the indicated remedy to the part affected within the rectum. They have accomplished much good in my hands for cancer of the rectum, hæmorrhoids, stricture of the rectum, etc.

Suppositories.—These were formerly used as substitutes for the enema, and ordinarily made of a piece of castile soap, or coco butter, cut to correspond with the form and size of the rectum,

oiled, and then inserted within the sphincter muscle. It should, however, be borne in mind that a frequent resort to the administration of injections or the employment of suppositories, produces irritation of the mucous membrane lining the lower part of the rectum, and is undoubtedly in many instances an exciting cause of the development of hæmorrhoids and other organic alterations of this portion of the intestinal canal.

Injections by the Urethra.—Injections by the urethra are used chiefly in cases of gonorrhœa. A syringe for this purpose should have a well-rounded beak, and be capable of containing about half an ounce of the liquid to be employed. The syringe is to be held between the thumb and last three fingers of the right hand, the forefinger being free to push down the piston. The beak of the instrument must be inserted into the urethra with the greatest care, in order not to injure the mucous membrane; then, with the thumb and one or two fingers of the left hand, compress the glans around the tube so as to prevent the immediate escape of the liquid injected. It is generally recommended that pressure be made upon the perinæum opposite the neck of the bladder, to prevent the fluid from entering this organ. This precaution is scarcely necessary provided the piston be made to descend with a proper degree of force, and only expelling sufficient fluid to fill the canal, the sphincter muscle preventing the fluid from entering the cavity of the bladder. While the injection is being administered, however, it is well for the surgeon to manipulate the urethra thoroughly by passing the finger back and forth, thus facilitating the contact of the liquid with every portion of the mucous membrane.

Injections by the Vagina.—The vaginal syringe is usually about four inches in length and one inch in diameter, terminating in a rounded head, which is pierced by a number of holes, and having a solid plate piece made to fit the vaginal orifice, through which the tube passes into the cavity. This will prevent the fluid injected into the vagina from escaping; it also permits its walls to be thoroughly dilated, and, as a consequence, a thorough cleansing of all the lining tissue is effected. I have found this little hint of much practical importance in treating the diseases of the vagina. No especial directions are required further than stating that the instrument should be oiled and introduced well into the cavity.

CHAPTER XVI.

Vaccination.

THE operation consists in introducing beneath the cuticle the matter of the cow-pock, and may be performed upon persons of any age. Its preservative power, however, is not absolute; and even variola itself, either spontaneous or produced by inoculation, does not invariably preserve from subsequent attacks. But, although vaccination is sometimes powerless to prevent the appearance of variola, it always diminishes the severity of the disease. This property, which Jenner and his first successors did not even suspect, is thoroughly proven by statistics which have since been accumulated. In one of the most terrible epidemics of small-pox that have taken place in Europe since the discovery of vaccination,—that of Marseilles, in 1828,—more than ten thousand persons were attacked. Of these, two thousand only had been vaccinated, and of that number only forty-five ($2\frac{1}{4}$ per cent) died; whereas, one thousand five hundred ($18\frac{2}{3}$ per cent) of the eight thousand who had not been vaccinated were carried off by the pestilence. The propriety of revaccination is also fully established. In Germany, the various governments have been induced to pay great attention to revaccination, owing to the fact that it has proved efficient in arresting the epidemics. In Würtemberg, among forty-two thousand persons who had been revaccinated, only eight cases of varioloid occurred; whereas, one-third of the cases of variola were manifested in persons who had been vaccinated.

In regard to the proper time of collecting the lymph, in order to obtain it in its most efficient state for propagating the disease, it may be remarked, that, when taken on the fifth and eighth days inclusive, it rarely if ever fails. The younger the lymph the greater its intensity; and that obtained from a child is more to be depended upon than the lymph obtained from adults. The matter of primary vaccinations, too, is more energetic than that of secondary.

Several methods have been adopted for the preservation of vaccine matter, which is either accomplished by keeping the dry scab enclosed in wax, collodion, tin foil, or any convenient envelope, to exclude the air; or by collecting and preserving the lymph in a liquid state. This is done by puncturing the vesicle, and receiving the matter upon a plate of glass, placing over this a second plate, and making the edges air-tight with wax. Or capillary tubes may be employed, having a bulb at one extremity; then, by placing the open end in contact with the lymph,—the air in the bulb being previously rarefied by warmth, and then permitted to cool,—the fluid will be forced into the tube. The open extremity is now to be closed by the use of a spirit-lamp and blow-pipe. A still more convenient method of preserving the virus, and one which proves eminently successful, is to permit the lymph to dry on ivory or hard wooden points. These should be previously made sufficiently sharp to answer the purpose of a lancet in scratching the surface. They are to be preserved air-tight. Great precaution should be exercised never to use the virus obtained from a child which presents any unhealthy phenomena, any eruption, or any strumous or syphilitic taint. As a rule, the operation should be performed on the arm, at a point near the insertion of the deltoid muscle. Drawing the skin tense, remove the cuticle over a minute space by scratches with a pointed instrument, just sufficient to make the blood appear; and then apply the virus. If the scab be used, a small particle should be powdered and moistened with water and applied to the abraded surface, it being allowed to dry thoroughly before the part is covered. "The local signs indicating that the vaccination has taken effect are first apparent on the third or fourth day after the operation, at which period there is a slight degree of elevation and hardness of the skin (papular stage) at the seat of the puncture, and a trifling blush of redness immediately surrounding it. On the fifth and sixth days, a small quantity of liquor sanguinis is effused beneath the epidermis, and a vesicle is formed, which is whitish or pearly in appearance, of a roundish or oval figure, and umbilicated at its center. The vesicle goes on increasing in size until the eighth or ninth day, at which period it has become fully distended, and has attained its perfect development. On the ninth day it loses its umbilicated form, it becomes flattened on the surface, and sometimes more convex than at the circumference, and is composed of numerous small

cells, which are filled with a limpid and transparent lymph. On the eighth day (sometimes the ninth) the perfect vesicle is surrounded by an inflamed areola, of a vivid red color (*the pearl upon the rose*), which gradually increases in extent from a few lines to more than two inches in diameter. The skin included in this areola is inflamed and tumefied, and is frequently the seat of eruption of a crop of small, transparent vesicles. On the tenth day, the redness and heat have increased; there is considerable itching in the part; the movements in the arm are somewhat painful; and the axillary glands are liable to become tender and swollen. It occasionally happens that at this period an erythematous blush spreads from the arm over the surface of the body, in irregular patches. On the eleventh day, the areola begins to diminish, the fluid contained within the vesicle has become purulent, and desiccation commences at its center, and proceeds gradually toward the circumference. During the succeeding days, the areola disappears more and more, the tumefaction subsides, and the vesicle desiccates into a dark-brownish crust of an irregular form. The crust, by a continuance of desiccation, diminishes in size, and assumes a blackish hue. It is detached at the end of seventeen days after vaccination, and leaves upon the skin a depressed cicatrix, at the bottom of which are seen numerous small pits (*foveolæ*), which correspond with the separate cells of which the vesicle was composed. The cicatrix is permanent, enduring for the remainder of life."

CHAPTER XVII.

Removal of Foreign Bodies.

From the Skin.—Needles, splinters of wood, or bits of glass or stone, etc., become occasionally imbedded in the tissues; and, though usually trifling, still their extraction may sometimes be a matter of difficulty as well as of importance. Needles may frequently be removed by pressing on the adjacent skin in such a manner as to make them pierce outward, when they can be grasped with the fingers or a forceps. If, however, the manipu-

lation does not determine the exact position of the needle, it should not be regarded advisable to cut down at hazard in hope of reaching it. Upon the discovery of irregular fragments beneath the skin,—which is often only after the occurrence of suppuration,—they should be at once cut down upon and extracted.

From the Eye.—The eye is very liable to become injured by the presence of foreign bodies,—such as particles of iron, steel or stone,—or of dust, cinders, and minute insects. If the profuse lachrymation which ensues be not sufficient to remove the offending substance, the lids should be well opened and the globe of the eye carefully examined, while the patient rolls the eyeball in various directions; should the object be thus brought into view, it may be removed with the point of a camel's-hair pencil, by the corner of a pocket-handkerchief, a probe, or it may be necessary to use a fine forceps. If it be desired to expose the conjunctiva of the upper lid, seize the lashes and draw the lid a little off from the globe, placing a probe or some similar instrument across the lid, parallel with the cartilage; then directing the patient to look downward, give the edge of the lid a sudden sweep upward and backward, at the same time making pressure upon the probe. Should a particle of lime get into the eye, it must, of course, be removed as quickly as possible, and a lotion of Belladonna or Hypericum immediately applied. The discomfort occasioned by the pressure of the irritating substance usually remains for a time after the cause has been removed; which will commonly be relieved, however, by applying tepid or cold water to the lids.

From the Nostril.—These cases are quite peculiar to children, who frequently thrust such articles as beans, peas, coffee-grains, buttons, and the like, into their nose by way of amusement. Unless the manipulation be conducted with great care, the lining membrane becomes swollen in consequence of the pressure and irritation occasioned by the efforts to dislodge them; the blood flows more freely, and the passage becomes additionally occluded by clots of blood. If the object cannot be seen, and readily removed with a forceps, it is well to syringe the nose to wash out the coagula and inspissated mucus which fill the cavity. The foreign substance might also be loosened, unless it should consist of beans or something of the kind which would swell, by being brought in contact with warm water; or it may be

necessary to employ a flattened probe, slightly curved, which may sometimes be passed beyond the object in order to drag the latter downward; or the substance may be caught in the noose of a wire-armed canula. Inducing violent sneezing, — the other nostril being closed, — by administering a sternutatory, will sometimes accomplish the purpose. If the children become very much frightened and unmanageable during the efforts to relieve them, and thereby expose themselves to injury by the attempts made for the extraction of the foreign substance, they should be quieted by the administration of an anæsthetic.

From the Ear. — The lining membrane of the external auditory passages, especially near the membrana tympani, is so exquisitely sensitive that great pain and irritation, sometimes convulsions, are produced by the entrance of foreign substances. No time, however, is to be lost in effecting their removal; though the attempts should be made with great delicacy, as very unpleasant consequences have resulted from carelessness and the rude handling of instruments. If the patient be a child, it is generally advisable to employ an anæsthetic. The passage should then be examined by the aid of a speculum; and, if the object can be seen, it can usually be removed by the use of a flattened silver probe, slightly curved, or the scoop-shaped end of a director, a curette, or delicate forceps. The forceps devised by Toynbee will perhaps be found the most serviceable. They resemble the ordinary dissecting forceps except in being longer and very narrow, and bent at nearly a right angle immediately below the middle, so that the operator's hand may not obstruct his view. In most cases, however, more can be accomplished by means of a syringe and tepid water than by any other means, and with less danger of injuring the patient. This is particularly true if an insect has found its way into the meatus, or if the passage be impacted with wax.

From the Pharynx and Œsophagus. — Improperly masticated food may be arrested in its passage to the stomach, which frequently happens in paralytic persons and in lunatics, and is, hence, a common accident in insane hospitals; also, during the administration of an anæsthetic, food may be ejected from the stomach, and lodge in the œsophagus or pharynx. Small objects, such as pins, buttons, fish-bones, etc., usually become obstructed in the folds and pouches at the base of the tongue and

palate, causing uneasiness and constant coughing rather than actual strangling; while bodies of larger size are caught at the most constricted part of the pharynx, and by their pressure upon the larynx, or by the spasmodic irritation which they produce in the latter, endanger suffocation. The exact point of lodgment is the first thing to be ascertained; and this can usually be done by opening the patient's mouth widely, and making a careful exploration with the forefinger. If the surgeon be not able to remove it with his finger, he should make use of a dressing-forceps; or, should the body be too low down to enable him to reach it with his finger, its situation may be learned by sounding

Fig. 120.



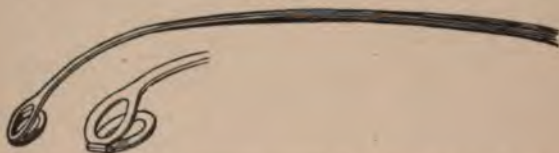
with a probang (Fig. 120), a flexible rod of smooth whalebone, tipped with a sponge or rounded block of ivory, and then efforts should be made to grasp it with the gullet-forceps, as represented in Fig. 121.

Fig. 121.



Dr. Bond, of Philadelphia, has contrived a very simple hook (Fig. 122), which will be found a most efficient instrument. It is made of silvered wire, long enough to reach even to the stomach, and sufficiently flexible to be molded into any shape. Having a piece of wire of the proper length, double it through the middle, and twist its free ends together; the looped extremity is then to

Fig. 122.



be bent at quite an acute angle with the shaft; it is thus capable of engaging small objects, as a pin or fish bone. If, however, the object cannot be withdrawn, efforts should be made to force it into the stomach by employing a probang. Should the attempt prove unsuccessful, and the symptoms be urgent, nothing remains but to resort to œsophagotomy.

From the Larynx and Trachea.—Foreign bodies, such as pieces of money, cherry and plum stones, grains of coffee, corn, etc., are liable to be drawn into the larynx or trachea during a fit of crying, laughing, coughing, or the like, and become exceedingly difficult of removal, owing to the spasmodic closure of the glottis, which the presence of an irritant almost necessarily induces. The symptoms produced by the offending substance vary according to its position. If it be fixed in the rima glottidis, asphyxia is rapidly produced, and speedy loss of consciousness, followed by death, unless prompt relief be afforded by surgical interference. Should it be movable in the larynx and trachea, its motion will occasion violent spasmodic cough, continuing until complete exhaustion is produced. In other cases, the cough becomes less constant and violent, resembling the paroxysms of whooping-cough; or it may be similar to the cough attending an ordinary catarrh or pneumonia, so that it may even be mistaken for either of these; the character of the expectoration is also very similar. Auscultation will, however, enable the surgeon to detect the difference, from the fact that the impacted body almost always produces local pneumonia, or collapse of that portion of the pulmonary structure which is connected with the bronchial tube thus occluded. Frequently, too, the presence

of a foreign body may be recognized by feeling it with the finger placed on the outside of the passage. Besides the local symptoms which attend an accident of this character, the general condition of the patient suffers: he becomes emaciated, feverish, and, indeed, presents many of the symptoms peculiar to tuberculous disease of the lungs.

Before resorting to mechanical interference, the surgeon should satisfy himself, by careful investigation into the history as well as the present phenomena of the case, that a body has really passed into the respiratory canal, and that the symptoms are not due to inflammation consequent on other causes, but to impaction of an intruder in the pharynx or œsophagus. Provided the holding of the patient with his head downward, and slapping him on the back, do not aid the expulsive efforts of nature sufficiently to remove the substance, nothing further can be done than to decide between performing tracheotomy and laryngotomy, and then proceed at once to the operation.

From the Urethra.—The urethra of both sexes is liable to be blocked up by the lodgment therein of fragments of calculi, portions of catheters or bougies which have been broken during operations, or by foreign bodies introduced from malicious or otherwise improper motives. The prominent symptoms are, more or less complete retention of urine, local inflammation, and pain. If the precise point of obstruction cannot be ascertained by manipulation with the finger, a bougie or catheter is to be employed. To effect a removal of the body, the simplest expedient is to introduce a large-sized bougie down to it, hoping that the expulsive power of the bladder upon the accumulated urine may free the canal thus dilated, when the instrument is withdrawn.

Urethral forceps, jointed curettes, etc., have been proposed for grasping the body. Should all other means prove fruitless, an incision is to be made and the object extracted through the opening. The latter proceeding will rarely be required in case of the female urethra, owing to its straightness, shortness, and capacity for dilatation.

From the Vagina.—Cases of this kind sometimes require much judgment and mechanical skill, though usually foreign objects can be removed without difficulty by exercising patience and gentleness, together with a free use of Olive oil. Though

the passage is capable of great dilatation, still there is much danger of injuring the mucous membranes. No instruments should be introduced unless guided by the finger or watched by means of a speculum.

CHAPTER XVIII.

Post-Mortem Examinations.

THE valuable contributions to pathological science, exhibiting the practical knowledge derived from carefully and well-conducted autopsies, attest the importance of these operations, and the advantages to accrue by their frequent repetition. In order, however, that an examination of this character should lose none of its value, it is required that it be made with the greatest accuracy,—the surgeon having a thorough knowledge of all the particulars likely to exercise the least practical bearing upon the case undergoing investigation. Thus, he should collect a statement of all the symptoms presented during the progress of the disease; also taking into account the age of the patient, his temperament, the degree of muscular development, mode of life, emaciation, the length of time since death; at the same time noting all external injuries, as wounds, bruises, and the like. Still, it is to be remarked, that, in conducting autopsies, much will necessarily depend on the skill and experience of the operator; and hence, a few general directions are deemed sufficient, the more minute details of the examination being left to the ingenuity of the surgeon.

The Instruments Required.—These include three or four scalpels, a cartilage-knife, a "brain-knife," a pair of dissecting-forceps, a saw, hammer, chisel, rachitome, enterotome, scissors, needles, and thread. The *scalpels* should be of medium size, such as are employed in ordinary dissecting, one of them having a probe point. The *cartilage-knife* should be strong and heavy, the handle being of iron or steel. The "*brain-knife*," No. 1, Fig. 123, used for slicing the brain, should be nine or ten inches in length by one inch and a half in width, round at the point, thin, but not

very sharp. The *saw* is the same as that used in ordinary amputations, with the exception of having a shoulder to prevent its cutting too deep. The *hammer*, No. 2, is provided with an iron handle, curved at its extremity, while the upper portion of the head of the instrument is wedge-shaped. The *chisel*, No. 3, used to remove portions of bone, has a narrow edge, and is strong and straight, having a short steel handle. The *rachitome*, No. 4, consists of steel, has a heavy, slightly curved handle, the head

Fig. 123.



having a blunt edge on the side corresponding with the convexity of the curve. It is employed to break the laminae of the vertebrae, in order to expose the spinal cord, which is accomplished by placing the edge against the bone and striking the head of the instrument with the hammer. The *enterotome*, No. 5, is a pair of scissors, employed in cutting open the intestinal tube. It is made with one of its blades a little longer than the other, which is furnished with a blunt hook at its extremity, that is inserted into the gut. By this means the blade is prevented from slipping out at each

successive cut. The *needles* used to sew up the incisions made, differ from the ordinary needles employed by the surgeon, in being very large and roughened in the shank, to prevent the fingers from slipping.

The Order to Be Observed.—The order of prosecuting the examination will of course depend somewhat upon the organs affected. Provided, however, the *Brain* is to be inspected, it should be exposed first of all, in view of the fact that the cerebral vessels are liable to become emptied of their contents immediately after the atmospheric pressure is removed, which is effected so soon as the other cavities of the body are opened. To remove the "skull-cap," first part the hair over the summit of the head from ear to ear, after which divide the integuments in the same line, reflecting

Fig. 124.



the skin over the occiput and the forehead, carrying the flap in front as far as the edge of the hair. The soft parts should now be divided with a sweep of the scalpel, and the skull sawn through in the dotted line shown in Fig. 124, and the "cap" pried up with the chisel. Dividing the *dura mater*, the brain is to be removed by passing the hand under the anterior cerebral lobes, in order to raise this portion of the organ, while,

with the knife in the other hand, the optic and other nerves, together with the tentorium and spinal cord, are to be divided, when the brain can be gently turned out from its cavity. The peculiar appearance of its surface is then to be observed; after which its internal structure may be examined by slicing it carefully with the brain-knife. As much as possible of it should then be replaced, and the calvaria put in position and fastened by sewing the divided portions of the temporal fascia together. The flaps of integument are next brought into apposition and sewed by the continued suture.

The *Spinal Cord* is examined by placing the body on its face, then making an incision in the line of the vertebral column, and turning the flaps each way from the spinous processes; the laminae are then to be broken by the use of the rachitome and hammer, and the arch of the vertebræ removed; after which a few strokes with the scalpel will expose the *dura mater*.

The *Orbit* is examined by first removing the skull-cap, after which the orbital plate of the frontal bone is to be chiseled away. The *Eyeball* is thus exposed also; or it may be extirpated in the ordinary manner, by passing a ligature through it, making it tense, and severing its attachments by a sweep of the knife.

The *Thoracic and Abdominal Viscera* should be removed in a body, previously ascertaining whether there exist any abnormal adhesions to the interior of the surrounding walls. An incision is to be made along the mesian line, extending from the inter-clavicular notch to the pubes, avoiding the umbilicus by making a slight curve. The tissues are then to be dissected from the sternum and costal cartilages, and the latter severed at their point of attachment with the ribs, also carrying the knife transversely across the chest to divide the soft parts adhering to the lower cartilages. The "breast-plate" may then be lifted by dissecting away the loose areolar tissue from its under side. A transverse incision should now be made, to extend each way from the umbilicus, and the flaps of tissue thus formed turned back, when the thoracic and abdominal organs will be exposed *in situ*. The condition of the pleural cavities is next to be ascertained as regards the amount of fluid present, the extent of the adhesions contracted, and the like; after which, the hand is to be carried around the lungs, to free them from whatever attachments may exist. Incisions may also be made through their lobes, in order to determine the morbid changes that have occurred within their internal structure. Dividing the trachea and œsophagus, together with the large vessels at the base of the neck, the whole mass of viscera is gradually lifted out, the dissection being carried down the spine, the diaphragm being severed from its costal attachment, and a ligature placed around the rectum before the entire contents of the cavities are displaced. The liver, kidneys, pancreas, and spleen are examined by making sections into them in various directions, while the cavities of the *Heart* are to be opened as follows: 1. Carry an incision from the orifice of one vena cava to the other, through the anterior portion of the organ, which will open the cavity of the *right auricle*; this cut should then be conducted through the *right auricular appendage*. 2. Pass the forefinger into the *right ventricle* and carry the knife through its anterior wall parallel with the interventricular septum; make a second incision at an acute angle with the former, thus making a triangular flap in the anterior wall, by means of which

the cavity will be entirely exposed. 3. Now pass the finger upward into the pulmonary artery, dividing it a short distance; after which the left auricle and ventricle may be opened in a similar manner described for opening the right side of the organ.

The *Stomach* is examined by making an incision along its lesser curvature; the *Bladder*, by opening it from before backward. After returning the viscera, some absorbent material, as bran, cotton, or tow, should also be introduced into the cavity to absorb the liquids which may have been poured out. The "breast-plate" should now be replaced, and the incisions sewed up by the continued suture. During the entire operation, if conducted in the presence of the friends, much care should be taken not to soil the clothes or furniture, or in any manner disfigure the face of the subject.

CHAPTER XIX.

Poisons and Their Antidotes.

The Immediate Treatment of Cases of Poisoning.— Since cases of poisoning come frequently under the care of the physician, and the immediate treatment usually requires the use of the stomach-pump, I shall give the symptoms and treatment of some of the more common forms of drug-poisoning.

The stomach-pump, to be of service, should be used soon after the poison has been taken, at least before absorption has taken place. It may be necessary to use a mouth gag for the purpose of keeping the mouth open, and to prevent any injury to the tube from the patient's teeth. The hose or tube should be thoroughly lubricated, and introduced with care, the head being well thrown back. In poisoning with some acids, as Sulphuric, Hydrochloric, etc., great care must be used in its introduction. Its use should not be attempted when there is much tissue-softening, for fear of perforation. Before removing the contents of the stomach, a quantity of warm water should be first pumped into this viscus, which will facilitate the removal. In case the stomach-pump is not at hand, an emetic may be administered.

One of the safest and quickest is Zinc Sulphate, gr. x. to xx.; or Copper Sulphate, gr. v. to x.; which in most instances should be followed by copious drafts of warm water.

Sulphuric Acid.—When taken undiluted, the symptoms come on immediately; the clothing, lips, or any part with which it has come in contact, are stained and burned; and there is intense burning pain from the mouth to the stomach. Soon vomiting commences, of a dark-colored liquid, containing portions of mucous membrane. Countenance glazed; skin cold and clammy. Convulsions may precede death.

Treatment.—If there is much softening, do not use the stomach-pump. Do not give water. Give whatever alkali is at hand. Calcined Magnesia is preferable; use it suspended in milk. If nothing better is at hand, give soap, ashes, pulverized plaster from the ceiling, white of egg, Olive or Almond oil, etc.

Nitric Acid.—The symptoms are nearly the same as from Sulphuric acid. The stains produced are yellow, while those from Sulphuric acid are black.

Treatment.—Same as for Sulphuric acid.

Hydrochloric Acid.—The symptoms and treatment are nearly the same as for Sulphuric acid.

Carbolic Acid.—Large doses are almost always immediately fatal. The symptoms are: Great and immediate abdominal pain; lining membrane of the mouth white and hardened; skin clammy, cold; contracted pupils; odor of the acid perceptible.

Treatment.—Free administration of Olive or Almond oil, or lard.

Oxalic Acid.—Dark, chocolate-colored matter vomited. Burning pain from the mouth to the stomach; cramps; delirium, possibly convulsions.

Treatment.—Alkaline carbonates *should not* be given. Lime water, chalk, milk, Gum Acacia water. If vomiting has not taken place when first called, remove the contents of the stomach by the pump, or an emetic.

Hydrocyanic Acid (Laurel Water, Etc.).—Eructations with the odor of the acid; giddiness, nausea, quickened pulse, tetanus, convulsions, etc.

Treatment.—Inhalations of Ammonia; cold douche; Chlorine; warm frictions to the skin.

Opium and Morphine.—Drowsy, stupid condition, continuing to profound stupor; breathing slow and feeble, and *pupils strongly contracted*.

Treatment.—Owing to the condition of torpor, emetics are to be used in increased doses, even double the usual quantity. If seen soon after the drug has been taken, the stomach-pump should be used, and the stomach thoroughly washed, until no trace of the drug remains. Use active means to arouse the patient from his lethargy. He should be made to walk, supported by two attendants. Flagellations with a wet towel; *strong Coffee*; hypodermic injection of solution of Atropia; artificial respiration; Electricity; Tannic acid, which forms with Morphia tannate of morphia, which is insoluble in water. Attention must be directed to the state of the pulse, and stimulants given in small quantities if demanded by the prostration of the patient. A half-hour rest and sleep may be allowed after the patient becomes moderately sensible, which may be permitted from time to time.

Arsenic.—Violent burning in the stomach and intestinal tract; vomiting; thirst; later, purging; pulse small and frequent; respiration irregular; skin cold and clammy.

Treatment.—Immediate removal of the poison by pump or an emetic. Ferric Hydrate freshly prepared, in large quantity. Demulcent drinks; Magnesia; oil.

Strychnia.—Tetanic convulsions; opisthotonos; gasping respiration; frequently frothing at the mouth. Between the convulsions the patient's mind is usually clear. Convulsions similar to the first rapidly follow.

Treatment.—Stomach-pump or emetic; Tannic acid, given in the proportion of twenty parts of the acid to one of the Strychnia. Chloroform may be given during the spasms.

Chloral.—Diminished frequency of respiration and circulation; pupils contracted; conjunctivæ red.

Treatment.—Same as for Opium-poisoning. Always try artificial respiration.

Corrosive Sublimate.—*Treatment.*—Evacuate the stomach immediately. Give white of egg in large quantity; milk, and starch water.

Nitrate of Silver.—*Treatment.*—Dissolve common Salt in water, and give in large quantities.

Belladonna.—*Treatment.*—Give Opium tincture or Morphine; of the tincture, from thirty to sixty drops, which may be repeated every fifteen minutes till its effect is manifest.

Acro-Narcotics.—Among these poisons are Aconite, Conium, Gelsemium, Veratrum, Lobelia, Digitalis, etc.

Treatment.—Evacuate the stomach, and give diffusible stimulants, strong Coffee, etc.

CHAPTER XX.

Effects of Heat and Cold.

Burns and Scalds.—Heat, communicated from solid bodies, causes burns; from fluid or gaseous bodies, produces scalds. The severity of burns depends upon the intensity of heat and duration of contact. Heated bodies injure more than heated liquids. The former char, and the injury extends deep into the structures. The latter spread, and the burn has more surface extent.

The varieties of burns are: 1st. Increased vascularity, with slight inflammation of the integument, unattended by vesication; tends to resolution. 2d. Vesicular, in which the cuticle is blistered, followed by ulceration. 3d. Death of the part burned; mortification. Dupuytren classifies them into six degrees: 1st. Where the cuticle is merely scorched. 2d. Where it is raised in blisters. 3d. Where the cutis vera is more or less destroyed. 4th. When the cuticle and true skin are involved, reaching to the subcutaneous cellular tissue. 5th. Where the muscles and fasciæ are involved. 6th. Where the whole thickness of structures is implicated, with carbonization of the osseous tissue.

The *effects* of heat are dangerous according to intensity and extent of surface; are more serious upon the head and face and trunk than upon the extremities. Children and old persons and those of impaired health suffer more than the middle-aged. There are three stages of constitutional disturbance: 1st. Shock.

2d. Reaction and inflammation. 3d. Suppuration and exhaustion. The effects of shock are depression and congestion, with cold, shivering, and collapse, which lasts from thirty-six to forty-eight hours; death in children is caused by coma. Reaction and inflammation take place from the second day to the second week, and may be accompanied by sympathetic fever, inflammation of the thoracic and abdominal organs, perforating ulcer of the duodenum, peritonitis and death, suppuration and exhaustion, hectic fever or pyæmia, congestion of the lungs or pleura, constitutional irritation from long-continued and exhausting discharges.

Scalds affect extent of surface rather than depth; and the skin, when affected to any considerable extent, on account of its being richly endowed with nerves, implicates internal organs. The appearance of the hair will determine the difference between burns and scalds. Scalds of the first class, covering one-half of the body, may prove fatal; those of the second class, covering one-quarter of the body, are likely to produce death; and those of the third class are apt to produce death if one square foot of the body is affected.

Constitutional Treatment.—The treatment of burns is constitutional and local. The first thing to be done is to bring about reaction and relieve constitutional disturbances; for which either of the following remedies may be used: *Aconite*, *Arnica*, *Carbo veg.*, *Coffea*, *China*, *Causticum*, *Hepar sulphur*, *Phosphorus*.

SPECIAL INDICATIONS.

Phosphoric Acid.—Hot skin, thirst, hard and frequent pulse.

Arnica.—To allay extreme sensibility; also where there is general restlessness, and intense pain at the seat of injury.

Arsenicum.—If ulcers form, and gangrene threatens.

Coffea.—To promote sleep, and allay nervous excitement.

Causticum.—For old burns, burns of the lips and tongue.

Carbo Veg.—In those extreme cases where the shock is so excessive as to threaten complete extinction of life. (See *Secale*.)

Local Treatment.—The local treatment is to use warm applications, preserve a uniform temperature, and prevent contact of air with the wound. Applications of *Cantharides*, *Rhus radicans*, *Urtica urens*, and *Terebinth* (one ounce of the tincture to four ounces of water), are our most valuable remedies. Dr. Ludlam recommends *Urtica urens* and Olive oil mixed, one

Calendula. Adm. 16/577.

drachm of the tincture to eight ounces of oil. Apply pledgets saturated with the mixture to the part. Cleghorn advises warm Vinegar, or Creosote water (one drachm to one pint of water) as a valuable remedy. *Bicarbonate of Soda* is much admired. Glycerine and albumen, Carron oil, Petroleum, Cosmolinë, Collodion, cotton in a thick layer, carbonated cotton, and the dry-earth treatment have their advocates. Prick the vesicles with a fine needle. Cicatrices are serious, and should be prevented if possible during treatment by resistant forces, such as adhesive strips, bandages, etc. The contraction in cicatrices following burns and scalds is greater than that of any other cicatrices; deformities are excessive. Great care is required in burns near orifices; burns on the fingers should be carefully watched to prevent contraction. Dupuytren's three rules, in regard to operations on cicatrices, should be observed, namely: 1. *Wait* at least one year. 2. Never operate unless certain of obtaining a larger cicatrix than the previous one. 3. Improper in anchylosis.

The Effects of Cold.—These are both constitutional and local. The constitutional effects are: Irresistible desire to sleep, congestion of the brain, pallor and coldness of surface, feeble pulse, almost imperceptible respiration, dilated pupils, tetanic spasms. At the siege of Corinth, in 1862, few soldiers at the front suffered from frost bite, though the cold was severe, and the thermometer at 12°. At more remote parts of the lines, where fires were allowed, the men suffered seriously from frost bite. Alternation of temperature from cold to warm increases the liability to frost bite; also, damp and cold air.

The local effects of cold are divided into *Pernio*, or Chilblain, and Frost Bite. *Pernio* is a slight degree of inflammation from sudden alternations of temperature, with atonic inflammation of the skin. Delicate persons suffer from it in damp and cold weather, by putting their feet to the fire after coming in from the cold. There are three degrees of this inflammation: 1. Skin red in patches and swollen; burning, itching, or tingling pain. 2. Vesications; skin bluish and purple. 3. Ulceration or sloughing which is superficial is often met with in this climate in winter; disappearing in summer, and returning again in early winter. It appears in persons of weak digestion, having dyspepsia and imperfect circulation; and attacks the nose, ears, toes, fingers, and heels. There is tingling, burning, and itching; vesicles form,

containing a serous fluid, and terminating in sores. It is difficult to cure.

Treatment.—Constitutional remedies are: *Agar.*, *Canth.*, *Arn.*, *Ars.*, *Bell.*, *Camph.*, *Nux vom.*, *Rhus tox.*, *Puls.*, *Nit. ac.*, as indicated.

Particular indications.—*Bell.*, *Puls.*, *Kali carb.*, for chilblains of a bluish appearance; *Cyc.*, *Lyc.*, and *Nux.* for bright red; if very painful, *Bell.*, *Puls.*, *Petrol.*; if inflamed, *Cham.*, *Ars.*, and *Puls.*; if ulcerated, *Ars.*, *Puls.*, *Carbo veg.*, and *Petrol.*; if gangrenous, *Ars.* and *Lach.*; *Nit. ac.*, when there exists much swelling and pain; *Rhus tox.*, burning and itching in the after part of the day, disposition to scratch, with blotches intervening.

Chilblains.—Bathe the feet or other parts in cool water, and rub with a coarse towel, hair glove, or flesh-brush; apply Cosmo-line externally. The effects of stimulants are pernicious. Use the following application externally: Iodine, one part by weight; Ether, thirty parts; and Collodion one hundred.

Frost Bite.—Frost bite affects the nose, ears, toes, fingers, and heels.

Symptoms.—The affected part has a dull red color, caused by a deficient supply of arterial blood, and stagnation in the veins. If the cold continues, the venous blood will be gradually expelled by tissue-contractility. The part feels stiff, is of a livid color, and is numb and shrunken; sensibility and motion are lost; gangrene threatens. The frost-bitten patient is unconscious, and the powers of life gradually cease. The person grows feeble and languid, inclining to sleep; becomes comatose, and dies. Evil effects of stimulants in coma.

General Treatment.—Local friction with snow will be found useful in pernio. Frozen feet should be warmed from *within* outward, and the patient's strength supported. When sphacelus ensues, amputate above the line of demarcation, in the sound tissues. In *suspended animation* from long exposure to cold, put the patient in a cool room, use friction, and administer warm, stimulating drinks. When necessary, artificial respiration may be resorted to. In cases of coma, resulting from cold, employ friction with flannel over the whole surface, and put the patient to bed in a room of moderate temperature.

Internal Remedies.—*Agar.*, *Arn.*, *Ars.*, *Kali carb.*, *Nit. ac.*, *Nux vom.*, *Puls.*, *Rhus tox.*, *Petrol.*, *Zinc.*, *Sulph.*

For Vesications: *Ars.*, *Lach.*, *Rhus tox.*, *Carbo veg.* For Chilblains, returning with every cold change: *Petrol.* or *Nitric acid.* Ulcerations: *Hepar*, *Merc.*, *Calc.*, *Calend.*, *Sil.* Chilblains on feet and hands: *Ant. crud.*, *Zinc.*, *Sulph.*

CHAPTER XXI.

SECTION I.

Boils and Carbuncles.

Furunculus, or Boil.—Furuncles are hard, red, and circumscribed tumors, painful, ending in suppuration. The inflammation is of an asthenic type, and results from vitiated blood. The skin and areolar tissue are involved; the discharge is a thin, flaky lymph; the areolar tissue becomes disorganized, and forms a core. They often appear every spring, from high living in winter; and sometimes succeed febrile diseases; then they are critical. They appear in young and vigorous persons with gastric and hepatic disorders; and are also induced by climatic changes, errors in diet, etc. If left to itself, bursts at its apex; matter exudes; core remains; inflammation then abates; remove slough. They appear at the climacteric age, and are also caused by teething, pubescence, etc.

Treatment.—Correct the system, and poultice with *Calc. mur.*, two drachms to two ounces of water.

The remedies are: *Arn.*, *Bell.*, *Sil.*, *Ars.*, *Caps.*, *Hydrast.*, *Hepar*, *Kali jod.*, *Picric ac.*, *China*, *Phytol.*, *Kali carb.*, *Sulph.* Fill cavity with lint wet with *Calendula*. To retard when small, *Argent nit.* To eradicate predisposition: *Arn.*, *Berb. vulg.*, *Calc.*, *Lyc.*, *Nux.*, *Phos.*, *Mur. ac.*, *Sulph.* Large boils with excessive suppuration: *Hepar.*, *Lyc.*, *Nit. ac.*, *Sil.*, *Phos.*, *Tart. em.* Small ones: *Arn.*, *Bell.*, *Hepar*, *Picric ac.*, *Sulph.*, *Zinc.* When suppuration progresses slowly, *Hepar*; to abort suppuration, *Merc.* Itching and burning, *Ant. Crud.*, *Carbo veg.*, *Thuja*, *Stilling.*, *Lyc.*, and *Arn.* Hale recommends *Asclep.*, *Erig.*, *Graph.*, *Phyt.*, *Iris. vers.*, *Stilling.*

Anthrax, or Carbuncle.—This is of an asthenic type, and may be termed a malignant boil. It is rare in young people;

occurs more frequently in the middle period of life, in the irritable and debilitated, and is often attended with fever. It begins as a hard, dull red swelling, tender and painful; in a few days of increase, it becomes a broad, flat tumor, doughy and livid in color. Softening and suppuration then take place, giving exit to a thin ichor; and, if pressure is made, a thick, glutinous matter exudes; the ulcerated apertures enlarge, with sloughing of the areolar tissue. It indicates vitiated blood.

Pathology.—Inflammation of the radicles, or prolongations, of the subcutaneous areolar tissue, dipping down into the deeper structures; the skeleton tissue. It varies from the size of a half-dollar to that of a dinner plate; occurs more frequently on the back, nape of the neck, and on the nates; after the hardness passes away, it becomes soft and quaggy, with a number of sinuses, which emit a thin discharge, likened unto flour and water mixed.

Treatment.—1. Remove the constitutional faults. 2. Favor the suppurative process, and restore healthy action. Give *Bry.*, *Ars.*, *Bell.*, *Rhus.*, *Apis*, *Anthracin*, *Sil.*, *Lach.*, *China*, *Pyrola rotund.*, *Calc. mur.*, *Mur. ac.*, *Hyos.*, *Creos.*

SPECIAL INDICATIONS.

Arnica.—As a prophylactic in the beginning.

Arsenicum.—Intense burning, a sensation as if boiling water was running beneath the integument; pulse small, irregular, and frequent, with cold sweats; persons of a nervous, choleric temperament, who have suffered long; emaciation, vomiting of fluids, burning thirst; or bilious diarrhœa, fever, prostration; malignant cases.

Belladonna.—When cerebral symptoms appear, red face, shining eyes, and severe heat; tendency to erysipelatous inflammation; parts red and swollen.

China.—When asthenic symptoms are strongly marked; loss of blood or miasm influencing the disease; exhaustion; pyæmic symptoms.

Hyoscyamus.—In nervous or hysterical persons; coma vigil or great restlessness; optical illusions; tumors; constriction of the pharynx; itching of the part.

Lachesis.—Prostration, with nervous and vascular erethism; parts look purplish, with blebs here and there. (See Creosote.)

Mercurius.—If disease is tardy; with considerable inflammation, followed by *Hepar sulph.*

Muriatic Acid.—In scrofulous persons, with ulcers on the gums; feeling of emptiness in the stomach; frequent desire to urinate; profuse, clear urine.

Rhus Tox.—Burning and itching around the carbuncle; vertigo, stupor, pale face, frequent pulse.

Silicea.—After suppuration has fairly set in.

Local Treatment.—Open, and let out discharges. Paget opposes free incisions. Helmuth agrees; only incise sufficiently to remove slough; remove with forceps. Poultices of ground flaxseed, or elm bark, charcoal, or yeast; strips of cloth dipped in a solution of Muriate of Lime and applied constantly.

SECTION II.

Whitlow.

Paronychia, or Whitlow, is an inflammation at the end of a finger or thumb, having a tendency to suppurate, and to recur in debilitated or impaired constitutions. The *cutaneous* whitlow affects more particularly the surface of the skin, and is accompanied with burning pain and effusion of a bloody serum or fluid, which forms a bleb upon the surface. The *subcutaneous* is attended with great pain, throbbing, and suppuration at the root of the nail, which often comes off. *Tendinous Whitlow*, or Thecal abscess, is an inflammation of the tendinous sheath of the finger. It is sometimes called *Felon*, when showing a malignant type, and affecting the periosteum.

Causes.—Whitlow arises from various local causes, such as cutting the nail too close, bruises, splinters, needle pricks, burns, sudden application of warmth to a part exposed to cold; the introduction of poisonous or acrid matter into abrasions on the fingers; constitutional disorder. Symptoms are heat, pain, throbbing, and redness; as the swelling increases, there is great tension, with pain extending up the arm; the surface becomes livid, and shortly assumes a pale, cloudy appearance. If suppuration occur, a dirty-looking fluid is discharged, and subsequently the nail falls off, which may be substituted by an imperfect nail. Under less favorable circumstances, the part ulcerates, the finger inflames, the bone is implicated, and phlegmonous inflammation attacks the arm.

Treatment.—When indications of whitlow are first noticed, the finger should be immersed in hot lye, as warm as the patient can bear, or in the first dilution of hot Nitric acid, and kept there five or ten minutes at a time; the hand, when taken out, should be worn in a sling, and kept well up. By this prophylactic means the disease is sometimes aborted. Give a dose of *Silicea* or *Hepar* every two or three hours, till all trouble passes

away. Exposing a whitlow to the fumes of strong Nitric acid has often aborted it; but, to insure success, these means must be employed early. After the disease has existed for some time, a hot elm, ground flaxseed, or bread and milk poultice should be applied, and *Silicea* or *Hepar* given internally. If much fever exists, with increased pulse, etc., *Aconite* must be given. *Fluoric acid* and *Mercurius* are valuable remedies at this stage. Dr. Douglas advises that the finger be inserted into a cut lemon, and be retained for half an hour. This can be done by cutting off a piece of the end of this fruit, pulpifying the internal structure, and putting the finger into it. I have cured them by continued local anæsthesia.

Rhigolene.—The atomizing of this hydro-carbon, through Dr. Bigelow's apparatus, as described on page 122, upon the inflamed part, at the beginning of the disease, has produced in my hands the most beneficial results; the intensity of cold temporarily constricting the blood-vessels, and impeding circulation to an extent sufficient to check the disorder in its incipency. If the disease is seen at the beginning, and before the inflammation has become too extensive, three or four applications of ten minutes' interval, and each application being continued twelve or fifteen seconds, or until the skin turns white under the action of the remedy, has, in my hands, often broken up the disease; the parts soon being restored to their normal functions.

Accessory Means.—Hot fomentations, poultices, and free incisions in the later stages of the disease. In opening these abscesses, make the incision a little to one side of the median line, between and not over the joints. This process relieves tension, reduces swelling, prevents sloughing, and possibly disease of the bone. After the pus has been evacuated, *Silicea*, *Mercurius*, or *Sulphur* will greatly facilitate the cure. If the bone should become necrosed, it may require removal, in whole or in part, before the sore is healed. In such cases the soft tissue should always be left, and supported on a small finger-splint. If the inflammation extends to the hand and fore-arm, it must be treated on general principles. The skin of a boiled egg, wrapped around the affected part, is much praised; also a hot *Lobelia* compress, applied continually, has proved efficacious.

Special Indications for Remedies.—*Arsenicum* is a valuable remedy when the part assumes a bluish-red appearance, with intense burning pain, stiffness and rigidity of the joints.

Hepar Sulphur, when matter begins to form, great pain, yellow skin, with throbbing and burning; the part so sensitive that they cannot bear the weight of a poultice.

Sepia, when the end of the finger is inflamed, swollen, and itches, with throbbing, shooting, and burning pain; the redness mostly on the dorsal aspect of the digit, the throbbing on the palmar surface; the part dark red, and the pus visible.

Mercurius, when the pains are intolerable at night, with intense aching and burning under the finger-nail, with hardness of the surrounding skin, and the suppurative process slow.

Carbo veg., if the finger looks dark and angry, with burning, tearing, and throbbing; with strong disposition to ulcerate.

Causticum, when there is violent burning, aching under the finger-nail, with throbbing and threatened ulceration, especially if there be any protruding proud flesh near the nail.

Silicea is valuable when the bone is affected, the pain deep-seated, with proud flesh; pains increased when lying in bed.

Natrum sulph., when suppuration is progressing, with deep red swelling of the whole phalanx; great painfulness; patient looks pale and wan, chilly and feverish; worse in the morning; pain is better when exposed to cold air.

Juncus effusus has been locally applied with great success. The pith of the plant is the part employed.

Sulphur, when a scrofulous diathesis is present, with sticking, darting pains. The finger appears shriveled and dead, the joint stiff.

Electricity, applied early, has aborted whitlow. Attention should be given to *local treatment*; the horny and indurated epidermis, loosened by inflammatory action, should be cut away with scissors, and Calendulated cosmoline be applied to soften the integument.

SECTION III.

Ganglion and Teno-Synovitis.

Ganglion.—This is the term applied to an encysted tumor connected with the sheath of a tendon. They are simple or compound. The simple are circumscribed, and formed in the fringes of the synovial membrane. The compound are collections of

fluid in the sheath of the tendon itself. Ganglion is produced by a blow or a strain, but more frequently it appears without any known cause. The compound ganglion is sometimes produced as the result of teno-synovitis when it assumes the chronic type. It occurs most frequently on the back of the wrist, is free from pain, but attended with weakness, and rarely grows larger than a marble. Mr. Skey attributes its appearance to the frequent twisting of the wrists in patients who practice much at the piano, and in those performers on the violin who have occasion for much exercise of their wrists.

Treatment.—A simple ganglion may be frequently ruptured by a smart blow, which bursts the sac, and permits the escape of synovia. Well-directed pressure by some hard substance causes absorption and cure of this tumor. In rupturing the sac by mechanical violence the hand should be bent so as to tighten the skin over the cyst. In the same way the cyst may be opened by passing a tenotomy knife into the center of the tumor; afterward the part is to be well kneaded, so as to remove every drop of contained serum. Then apply a thick compress over the part, moistened with Benzoic acid, and hold it firmly by a roller. The acid may be advantageously given internally. *Phytolacca* and *Mezereum* are also remedies of efficiency in the cure. Consult also *Arum*, *Causticum*, and *Silicea*.

Teno-Synovitis, or Thecitis.—This is an acute inflammation of the sheaths of tendons, caused by twists, sprains, or other external violence. It is usually located about the hands and feet, and occasions a great degree of suffering, and oftentimes considerable constitutional derangement. Pain and tenderness are first observed along the course of the affected tendons, the suffering being greatly increased at night, which becomes intense as the disease progresses; the pains are burning, boring, and throbbing, aggravated by the slightest pressure or movement. The pain extends throughout the entire length of the limb; and more or less swelling takes place along the course of the tendon, arising from effusion into the sheath. Upon examination a peculiar creaking sensation is communicated to the fingers, which resembles soft crepitus.

Treatment.—The remedies most to be relied upon are *Benzoic acid*, *Apis*, *Bryonia*, *Rhus tox.*, *Ruta grav.*, and *Mezereum*; and, if the part is hot and painful, with constitutional excitement, *Aconite*,

will accomplish much good ; Bryonia and Apis, if the soreness extends along the course of the tendon, producing much pain and tenderness ; local applications of Aconite solution applied to the part of pain, if heat and redness are marked. Benzoic acid, gr. iij., to Glycerine cerate, ʒi., well rubbed over the part when not too painful, or applied by means of a piece of cotton cloth, is very beneficial. Hypodermic applications of Belladonna or Apis have acted well in my hands.

SECTION IV.

Sprains.

Sprains are caused by an over-stretching of the ligaments and tendons, a rupture of some of their fibers having taken place, without dislocation. Sometimes the tissues are more or less lacerated, accompanied by severe pain and more or less swelling. It is troublesome and tedious, and often proves a most serious disorder, especially in persons of a rheumatic or scrofulous diathesis. Sprains differ from luxations, not only in the diminished amount of injury done to the ligaments of the joint, but in not being accompanied by any displacement of the articular surfaces of the bones that enter into the formation of the joint.

Symptoms. — The symptoms indicative of sprain vary according to the severity and extent of the injury. In the slighter forms the degree of pain corresponds with the amount of laceration and contusion of the nerve filaments and branches supplying the parts ; the pain is soon followed by evidences of inflammatory excitement, depending upon the violence and extent of the injury. In slight cases these phenomena gradually subside ; and in twenty-four or thirty-six hours, under the treatment of perfect rest and appropriate internal and local agents, the joint regains its strength and functions, all evidence of trouble having entirely disappeared.

In *severe* sprains, however, this favorable termination does not so readily follow ; the pain may be so severe at the moment as to cause faintness or sickness, and is referable to the affected joint ; there is impairment or total loss of motion or control over the injured part ; heat, tenderness, and swelling of the structures implicated, rapidly supervene ; while there is often more or less discoloration of the parts in consequence of extravasation of blood

into the cellular tissue. After the lapse of a few hours, serous effusions take place into the *bursa mucosa* and into the cavity of the articulation, followed by induration and a sense of crepitation when manipulating the joint. The pain, which is excessive from the first, often produces a marked depressing influence upon the entire nervous system. In rare cases the bursæ become so highly inflamed as to terminate in suppuration and sloughing.

A *severe* sprain is in fact often a much more serious accident, as regards its secondary effects, than a dislocation or fracture near a joint. Convalescence in such cases is usually tedious, the articulation remaining weak and tender for several months, and sometimes for years. Indeed, it not infrequently happens, especially in neglected or ill-treated cases, and sometimes, says Gross, "even when every possible precaution has been adopted, that the articulation not only continues to be weak and uncomfortable for a long time, but that the corresponding limb becomes cold, wasted, flabby and exquisitely sensitive, perhaps also, the seat of neuralgic pain, subject to severe exacerbation whenever exercise is attempted or there is a change in the weather." It occasionally happens, that, in severe or badly treated cases, the movements of the joint are never regained. Conjoined with this local disorder, the system of the patient sympathizes, and he becomes extremely nervous, irritable, and dyspeptic, even bordering upon hypochondriasis. The probable cause of all this is attributed to "the shock or concussion sustained by the nerves of the affected part at the time of injury, the effect thus produced exercising a pernicious influence upon the nutritive functions of the whole limb, and indirectly upon the well-being of the general system, especially the great nervous and ganglionic centers." The only accident with which a sprain may be confounded, is dislocation, but from this it may be readily distinguished by the absence of all those signs attended by a luxation of the joint.

Diagnosis.—In examining a patient with sprain, care must be exercised that the surgeon do not confound it with *dislocation*, or a *fracture near the joint*, two conditions resembling that of sprain, especially when occurring in the wrist or ankle joint. Thus, a sprain of the wrist, accompanied with effusion into the bursæ of the flexor tendons, producing a tumor on the palmar surface of this articulation, with pain and loss of motion, might readily be mistaken for Barton's fracture, and *vice versa*. Careful

manual examination, by making careful compression upon the surfaces of the joint, by flexion and extension; adduction and abduction; twisting internally and externally; a comparison of the length of the two limbs; the patient's control of the joint, etc., are the only means we have to ascertain the true condition of the articulation. The cartilage of joints in a normal state is not sensitive; it possesses no nerves, except those of nutrition. Any pain, therefore, remaining in the articulation, is evidence of an abnormal condition of these surfaces; therefore, whenever pain can be produced by pressure, even in the slightest degree, it will be safe to discharge the patient as cured, or well, so long as this state of things exists. The blood extravasated beneath the cartilage after injury to the joint, remains there as a foreign body, engenders inflammation whenever pressed upon by the articulating surfaces, and, if not absorbed, serious disease of the joint. By continued pressure of the joint surfaces together, the mischief slowly but persistently increases; and, if there exist any constitutional trouble, its progress is correspondingly more rapid. In the examination of a sprain, therefore, the surgeon should not be deterred, by the pain produced during the manipulation, from making a thorough exploration of the condition of the parts; and, if the patient is unable to endure the suffering, Etherization should be promptly used, as it is of the utmost importance that the precise nature of the injury should be understood. This is especially recommended in sprains of the ankle and wrist joints, to distinguish the former from a fracture of the lower fifth of the fibula, and the latter from Barton's fracture.

Treatment. — In the treatment of sprains, two leading indications present themselves in every case, whether slight or severe; the first is to limit and control inflammation; and the second, to restore the joint, if possible, to its primitive functions. The degree and severity of the injury done will regulate the character of the treatment to be pursued; as soon as the nature of the injury is determined, the limb should be carefully bandaged and placed perfectly at rest, either by extending it carefully upon a hair pillow, or by the use of appropriate splints, so as to insure certain quietude. To prevent the development of inflammatory excitement, the whole limb should be immersed in warm water, retaining it there fifteen or twenty minutes; then withdraw it, and cover the joint involved, with a warm saturated lotion of *Arnica*,

Hypericum, *Rhus tox.*, or *Ruta grav.*, as the nature of the injury demands, maintaining the limb at perfect rest during treatment.

Instead of removing the cloths as soon as they become cool, it is better to squeeze the lotion upon them as hot as can be borne, from a sponge, and as often as occasion may require. I generally prefer the *Ruta* lotion to any other in the deeper-seated joints, and *Hypericum* or *Rhus tox.* application in the superficial, applied by means of flannel, arranged in six or eight layers, and covered with a superficial layer of oiled silk, to confine heat and moisture. After twenty-four hours, if the pain has materially abated, the heat and moisture of the cloths may be gradually and imperceptibly diminished; and, in twenty-four hours thereafter, gentle use of the joint may be attempted. If motion produces an aggravation of pain, it should be at once discontinued, and not attempted again until movement of the joint is *painless*.

In sprains of the ankle-joint, Professor Gross says, he has "frequently seen the happiest effects produced by protracted immersion of the limb in hot Salt water." Under the treatment recommended, sprains of the less severe type are cured without the use of any internal treatment, and frequently very promptly and satisfactorily. In the *severe* and more common variety of sprain, in addition to the medication already referred to, the injured limb should be carefully bandaged, and placed perfectly at rest, in an easily elevated position, by means of carefully adjusted splints, and be retained in this manner, so as to insure more certain quietude. An excellent plan is to place the limb upon a hair pillow, covered with a strip of oiled silk, to prevent accumulation of the secretions, and to insure cleanliness; and apply the fomentations previously advised. When the pain and swelling are unusually severe, and there exists more or less constitutional irritation, with febrile reaction, *Aconite* lotion may be substituted for the *Arnica*, *Ruta grav.*, or *Rhus* applications, and, at the same time, be given internally. *Arnica*, *Bryonia*, *Conium*, or *Rhus* are remedies of value after the subsidence of the more active symptoms. In congestion of the joint, following sprain, *Aconite* is a much more serviceable remedy than *Arnica*, as it tends both to check the traumatic fever, as well as to subdue the inflammation and scatter the congestion going on within the joint. In sprains of a severe type, I have frequently used *Aconite* internally, and *Rhus* or *Ruta* as a lotion to the affected part, with the most satisfactory results. The violent strain which the nervous

system, in the neighborhood of the injury, undergoes, superinduces inflammatory excitement to a greater or less extent, which invariably requires the administration, internally, of *Aconite*, and externally, of *Hypericum*. If obstinate constipation occurs during treatment, which is very apt to ensue, the bowels must be relieved either by an enema, or a dose of *Nux vomica*, *Opium*, *Alumina*, *Platina*, *Podophyllin*, or, in case of their inaction, by the administration of a *laxative* remedy. Throughout the conduct of the case, the bandage should be carefully applied and watched; as, when properly and evenly adjusted, support is afforded to the injured joint, swelling and spasm controlled, and absorption of effused fluids prevented; but, let it become loose, or be unevenly applied, producing constriction of the limb at one point, and irritating the extremities by hanging loosely at another, much more harm than good will ensue from its use. After subsidence of the more urgent symptoms, stimulating lotions by the hand, in lieu of fomentations, which should be gradually withdrawn, will be found of great service in assisting the removal of effused fluids, and promoting the gradual restoration of the functions of the joint. At first they should be applied once or twice a day, cautiously increasing the frequency as pain and tenderness abate, using the precaution to keep the limb covered by flannel cloths saturated with the remedy employed. A weak solution of the tincture of *Iodine*, in the proportion of one to three of alcohol, I have found exceedingly beneficial in restoring impaired functions of joints. Inunctions, *Camphor*, *Ammonia*, and *Turpentine* embrocations, have been found of exceedingly great value after the subsidence of acute symptoms. Toward the close of treatment, the daily application of the roller must be kept up; for, beneficial as it is in the first stage, it is even more so during the secondary stage, for the purpose of giving support and tone to the already weakened limb. At a later period in the treatment, or when the disease has assumed a chronic form, producing sub-acute inflammation, or thickening of the tissues of the joint, the first attempt at movement of the limb is sometimes quite difficult, and attended with more or less pain. In this condition, along with the internal treatment, great benefit will be derived from magnetic baths, magnetism, medicated shower-bath or cold douches; the parts, immediately afterward, to be well rubbed with the bare hand or a piece of coarse flannel. In those cases where a more powerful impression is desirable, the use of the hot and cold douche, in

rapid alternation, has been highly recommended. Professor Gross has received marked benefit from the daily application of fish-brine, which seems, he says, "to possess other properties than those simply dependent upon the presence of saline matter, though it is impossible to define their character."

Painting the surface of the skin over the joint daily with *tincture of Iodine*, I have frequently found a remedy of considerable value in chronic cases, or when the more active symptoms have been controlled.

As soon as the disease has reached that stage, when passive motion does not kindle anew symptoms of acute inflammation, the joint must be gently exercised, and the patient compelled to move about in the open air. It must be remembered that motion, as Professor Gross remarks, "is the proper stimulus of a joint, as air is of the lungs, or food of the stomach; and when, after an injury, it is long neglected, serious consequences are sure to arise."

During this time the general health of the patient must be attended to; exercise in the open air insisted upon; dietetic and hygienic regulations enforced, and either one of the following remedies taken internally: *Agnus castus*, *Arnica*, *Ammonia carb.*, *Hypericum*, *Bryonia*, *Kali jod.*, *Pulsatilla*, *Rhus*, *Rumex*, *Ruta grav.*, *Nux vomica*, and *Sulphur*. Of these remedies, *Arnica*, *Hypericum*, *Kali jod.*, *Rhus tox.*, and *Ruta* are the most valuable, and, under ordinary circumstances, fulfill all indications of treatment.

Arnica. In the case of a laborer, who sprained his right shoulder very severely while at work, *Arnica* was given, and in one week the pains in the shoulder had ceased, improvement went on uninterruptedly, and in three weeks the patient was discharged cured.*

Rhus tox. In a sprain involving the middle joint of the thumb, in a strong, athletic, and vigorous person, the parts being exquisitely tender and painful to the touch, *Rhus tox.*, 30th, was administered, and the patient was cured in three weeks. *Hypericum* is a remedy of great value in contusion and laceration of nerve-fibers.

Apis mel. In the case of a young man, aged twenty, of a bilious, sanguine temperament, his left knee was badly sprained from

* *British Journal of Homœopathy*, vol. 23, page 185.

being thrown from a horse; two doses of *Apis mel.* are reported to have cured the patient in two weeks.*

In those cases of sprain involving the periosteum, *Ruta* is the best remedy, according to my experience, especially if the pains are aggravated during rest and relieved by motion; *Rhus tox.* is better adapted to injuries affecting the ligaments and fibrous tissues of the joints, the symptoms being increased during rest. *Stillingia* is serviceable when the disease attacks the periosteum, with a scrofulous condition of the bones, and *Arnica* is more appropriate when the muscular and soft structures become implicated in the diseased action. *Phytolacca* has afforded much relief in a few cases of severe sprains after the more acute symptoms had been controlled by the treatment above recommended.

Rupture of a muscle, whether resulting from external violence, or from the intensity of its own contraction, occurs almost always at the point of origin of the tendon, and requires relaxation by position, so as to approximate its divided ends, and maintain the limb for a sufficient length of time, until proper union takes place. The internal treatment consists in the administration of *Arnica* or *Rhus*, which are particularly adapted to sprains occurring in musculo-tendinous parts, with swelling and great pain. They may be used both locally and internally; the external use of *Rhus* being graduated in strength to meet the sensitiveness of the skin of the patient. *Bryonia* is useful in sprains where the pains are darting, and aggravated by motion, or when the pains are tense, drawing, and tearing, and do not bear movement, and especially when the muscular tissues are implicated. *Ammonia carb.* is useful in sprains attended with fatigue and weakness in the limbs, with stinging, tearing, and drawing in the joints as from shortening of the tendons; pains more on the right than on the left side; with great sensitiveness to cold and open air, especially evenings. *Lycop.*, *Petrol.*, and *Ruta* are appropriate when the more acute symptoms have passed away, and the disease begins to assume a chronic character.

Sepia is recommended by Dr. Goullon for many troublesome constitutional symptoms that may supervene upon a sprain.

If the patient suffers from the constitutional effects of any pre-existing disease, the remedies required to meet this defect must be given intercurrently with the medicine specifically indi-

* New York State Transactions, vol. 2, page 251.

cated for the sprain. I have treated several cases of sprain, occurring in syphilitic and strumous constitutions, which improved rapidly, and permanently, when constitutional remedies were employed to overcome these dyscrasias, and at the same time the treatment was adapted to the injured limb.

Mechanical Treatment.—Instruments, well adapted to these injuries as well as all others affecting the joints, whether from violence or the result of disease, and especially in those neglected or persistent cases, where the muscles have been involved, and by their contraction continually press the diseased articulations together, thus increasing the disease and deformity, have been devised by Prof. L. A. Sayre, of New York. One of these instruments, for the purpose of making proper extension, consists of a foot-piece of firm steel or hard rubber plate made to fit the sole of the foot. There is at the heel, says Sayre, "a hinge joint, and attached to it a rod, slightly curved, at the bottom, and extending up the back of the leg to near the knee; over the instep is a stirrup-like arch, with a hinge joint above, from which another rod mounts up in front of the leg, of equal length with the hinder one. These rods have a male and female screw or ratchet and cog, for purposes of extension, which are connected above by a firm band of sheeting, with a hinge on one side and lock on the

other, somewhat like a dog-collar. (Fig. 125.) This instrument is applied by means of firm adhesive strips, one inch in width, and long enough to reach from the ankle to the middle of the patella, and made to completely encircle the limb, as shown in Fig. 126.

Fig. 125.



Fig. 126.



The plaster is secured in this position to within an inch or two of its upper extremity by a well-adjusted roller, mounting from the ankle upward to the base of the knee-joint. The instrument is then adapted to the limb, and fixed firmly, all being secured and the foot held *in situ* by a number of strips of adhesive plaster, carefully applying a roller over the ends of the plaster to prevent their slipping, taking care to turn the upper extremities over the collar, which has

been previously locked just tight enough to be comfortable, and thus secured by a turn or two of the bandage, the whole being enveloped as is seen in Fig. 127.

If general œdema takes place, the disease increasing in severity, and especially if the parts have been too freely poulticed, as is most apt to occur, there will be observed a bluish livid appearance of the part, denoting a passive congestion of the capillary circulation. There is probably no system of treatment so pernicious in its effects upon a diseased articulation, no matter where it be situated, as the *continued application of a poultice*. In the more advanced stages of joint disease, the circulation is feeble and slow, and the heat and moisture inherent in poultices, entices an increased flow of blood to the part, engorging the capillaries to such an extent as to paralyze their power of action; and, having no power to pass the current along, œdema and final disintegration of the parts is the inevitable result. To overcome such a condition, and to assist the overburdened capillaries, pressure upon the hypertrophied cellular tissue about the joint should be made, and the limb placed in a horizontal position. Compression may be best made by the use of a large, coarse sponge, the water having been pressed out, and the sponge bound tightly and firmly about the joint; then the sponge, absorbing the medicated lotions that are poured upon it, increases its size, and a constant and uniform pressure is kept up, relieving the œdematous condition and livid appearance of the joint.

Fig. 127.



If the disease has still further advanced, and pus is contained within the articulation, as may be known by the concomitant symptoms, such as fever, loss of appetite, paleness, emaciation, irregular chills, etc., a free opening should be made in the most dependent part of the joint, so as to permit a thorough drainage of the contents, and which should be kept up so long as any matter forms within the joint. If there exists *caries* of the bone, a probe, armed with oakum, passed through the joint from side to side and forming a seton, is the most thorough and perfect manner of effecting complete drainage of the fluids within the articulation. As the seton is changed from time to time, small particles of bone will frequently pass out with it, and the opening will continue to diminish in size as the disease abates; the thin,

sanious, and watery discharge will, under the use of this agent and the constitutional remedies previously given, yield to a thick, laudable, and cream-colored pus. As this takes place the seton should be gradually diminished in size to a single thread, and finally removed altogether,—care being taken that the opening be not closed until every particle of matter is removed, as a few drops only have been known to produce serious mischief. At this period of the disease, it is a question, still mooted among surgeons, whether the joint should be permitted to become ankylosed, or an attempt be made to retain mobility, by passive and continual movement of the limb. Dr. Sayre instances the case of a young lady, in whom the ankle joint had been setoned for ten or twelve years, small pieces of bone having been thrown out, yet *the mobility of the joint is now perfect*. A result so desirable calls for the most careful and assiduous attention of the surgeon; particularly so, as frequent cases of this character have occurred, in which almost perfect motion of the joint has been preserved. Slight sprains are more liable to lapse into this condition of disease than those of a more severe character, owing to inattention of the patient to the injury in the first stage, in consequence of its slowness, and the neglect of appropriate treatment at the beginning of the accident.

This mechanical treatment is equally serviceable in all cases of severe injury affecting the joints, whether by injury, wound, or as the result of disease.

The author had under this method of treatment a person who sustained a gunshot wound through the ankle-joint during the late war of the rebellion, and which had been constantly discharging pus and pieces of bone since that time, but is now entirely healed, with full motion of the joint.

In several other cases involving injuries to the ankle-joint, with more or less impairment of the function of locomotion, this treatment, as recommended by Professor Sayre, has proved exceedingly efficacious, in each instance the patient being benefited beyond my most sanguine expectations.

SECTION V.

Wounds of Joints.

Wounds of joints, however insignificant they may be apparently, require the closest attention at the hands of the prac-

titioner; as, sooner or later, the most serious consequences are liable to supervene. The same variety of wounds occur here as in other parts of the body, and are to be regarded serious in proportion to their extent, the size of the joint injured, and the kind of wound inflicted.

Lacerated and gunshot wounds are particularly dangerous, frequently terminating in complete destruction of the articulation, if not also inducing the death of the patient. If the wound be large, with fracture of the articular extremities of the bones, one or both of these consequences will inevitably follow. The most astonishing recoveries, however, are sometimes met with in wounds of these parts, while at the same time it is no uncommon occurrence for the most trivial incised or punctured wound to terminate in partial or complete ankylosis. The source of danger in each particular case arises from the excessive inflammatory action that is set up in the joint (*traumatic arthritis*).

Symptoms.—The symptoms following severe wounds of the articulation are very marked. There will be an immediate escape of synovial fluid, with intense pain, tension and swelling of the part, together with great constitutional disturbance, the patient becoming deadly pale, faint and helpless. In the course of twelve or twenty-four hours, rigors supervene, followed by high fever, delirium, gastric derangement, extreme restlessness, and excessive thirst. In the mean time, the local symptoms increase; the heat, pain, and swelling become intense, the limb assuming in the course of forty-eight hours, not later than the fourth day, an erysipelatous blush; the synovial fluid increases in quantity, gradually becoming purulent; ulcers form, often discharging a highly fetid matter; the ligaments become yielding and softened; the bones are rendered carious, the patient at this time suffering with frequent rigors, fever, and copious, debilitating sweats.

The severity of the local symptoms is evidently due to the extent and depth of the synovial membrane, which rapidly suppurates, the pus being confined amid dense, unyielding tissues, which prevent its free exit. It appears that the suppuration is occasioned by the admission of air into the joint; as, in the most severe subcutaneous lacerations, occurring in luxations and fractures, suppuration rarely occurs. The character of the pus is also dependent upon its contact with the air, becoming acrid and putrescent, thus greatly adding to the local irritation.

Traumatic arthritis differs from the *idiopathic* variety in this circumstance: viz., that in the former the inflammation is exhibited primarily in the synovial membrane, the cartilages being implicated secondarily, the articular extremities of the bones not participating in the diseased action; whereas, in the *idiopathic* form, the osseous structures are first affected, the cartilages and synovial membrane suffering subsequently.

Complications.—The affections particularly liable to become complicated with wounds of the joints, include erysipelas, pyæmia, and tetanus.

Erysipelas, which indicates a low and vitiated state of the system, usually occurs within the first thirty-six hours; first manifesting itself at the seat of injury, thence spreading more or less extensively over the neighboring structures. Neither the size nor character of the wound, however, exercises any very marked influence in determining the time or severity of the attack, while its peculiar type will depend on the condition of the constitution at the time of the injury.

Pyæmia, resulting most frequently from lacerated, contused, and gunshot wounds, is a very dangerous complication, usually appearing in connection with abscesses in some of the viscera, as the lungs, liver, kidneys, or spleen.

The constitutional symptoms are always severe, there being great depression of the general system, indicated by low delirium, brown tongue, pulse small and fluttering, with profuse sweats.

The local symptoms are also intensified, the pain becoming exceedingly severe; the swelling greatly increases, the discharges abundant, being thin, sanious, and highly fetid.

Tetanus occurs much less frequently than either of the above affections; it usually exhibits itself from four days to two weeks after the accident. The most reliable premonitory symptoms are a feeling of lassitude, restlessness, uneasiness in the muscles, and stiffness about the lower jaw; the wound, if open, putting on an unhealthy appearance. Exposure to cold, wet, or draughts of air, with improper nourishment, are its principal predisposing causes.

Treatment.—In the treatment of wounded joints, the first thing to be ascertained is the extent and severity of the injury, and then to determine whether the lacerated limb can be saved or not. If the articulation is small, there is no doubt of complete

success in this direction ; but, if one of the large joints be involved, the danger is correspondingly increased. If the wound is simply an *incised* one, though one of the larger joints is opened, no surgeon will be justified in resorting to amputation. The proper course, under these circumstances, will be to approximate the lips of the wound by strips of adhesive plaster, to prevent the admission of air into the joint, and cover the whole articulation with a compress saturated with *Calendula*, *Hypericum*, *Ruta*, or *Staphysagria* lotions, and bind it down with a roller, extending from the distal part of the limb upward. If the wound is large, and the joint is extensively laid open, with much contusion and laceration, the danger becomes exceedingly great. In this case, all extraneous matter must be carefully removed from the wound by the use of the fingers and forceps, and any splinters of bone that may be produced by the injury must be searched for, and, if possible, extracted. If the foreign matter be deeply imbedded into the joint, and the wound is disproportionately small, causing irritation and pain in an attempt to extract it, the safest plan is to let it alone. This is particularly applicable to balls or other missiles lying deeply imbedded in the articulation. But if, on the contrary, the projectile lies loose in the cavity of the joint, it should be removed at once ; and so with reference to all other foreign matters that are readily accessible. All officious manipulation, whether by the finger, probe or other instrument, must be scrupulously avoided. If the bones composing the joint are comminuted, partial resection of the articular extremity, and removal of the splinters, may with propriety be practiced, more particularly if the constitution is vigorous, the patient young, and the soft parts not too extensively damaged. If, on the other hand, the patient is aged and health broken, amputation is the only resource.

The limb should be placed in an easy and elevated position, all motion being entirely prevented by the use of splints and other suitable means. If the inflammation is severe, *Aconite* internally will be demanded, as well as its constant application to the diseased parts, until inflammatory action has been subdued, when *Hypericum* or *Ruta grav.* lotions may be substituted, and *Arsenicum*, *Bryonia*, *Belladonna*, *Mercurius*, *Phosphorus*, *Hepar*, *Rhus tox.*, *Silicea*, *China*, and *Iodine* given internally, according to circumstances. When the suppurative stage arrives, and matter has formed within the joint, without an adequate outlet, a valve-

like incision should be made to procure an early discharge of the contained pus. A bandage should be carefully applied to the limb, from below upward, and from above downward, to give support to the diseased tissues, and prevent the burrowing of matter along the muscular sheaths, and by constant and uniform pressure, to squeeze out the pus as fast as formed. Injections of *Carbolic acid* or *Calendula* lotions should be thrown into the cavity of the joint two or three times a day, and kept constantly applied to the part by means of charpie or patent lint, in order to absorb the discharges as fast as thrown out. *Belladonna*, *China*, *Hepar sulph.*, *Calc. carb.*, *Silicea*, and *Sulphur* may be given internally, as circumstances require. If the patient possesses a lymphatic or scrofulous constitution, the last-named remedies will prove exceedingly beneficial. When the quantity of pus is excessive, *China* will be found an exceedingly valuable remedy, and should be given internally two or three times a day.

In cases of uncontrollable and excessive suppuration, the parts will either recover by union of their contiguous surfaces, or become so involved in the disease as to require removal. If the case proceeds favorably, as is most likely to occur if the previous treatment be followed, the discharge will gradually diminish, and the constitutional disturbance subside. In case of a termination of the injury by ankylosis, the limb must be placed in such a position as to be of the most service to the patient.

In the milder varieties of these wounds, where there is no risk either of life or limb, our chief object should be to guard against ankylosis, which is so prone to occur in all affections of the articulations. Passive motion, the judicious application of the roller, and the general and local measures recommended, will be the surest means to bring about a cure and frustrate bony union. *Primary* amputations may very properly be performed when a large joint is severely shattered, the external opening extensive, and the principal nerves and vessels of the limb injured. The rule, that all severe wounds of the large articulations of the extremities, especially when the result of gunshot or other injuries, are almost always fatal, if amputation be not speedily employed, does not necessarily hold good. In a large number of injuries of the knee and ankle joints, which fell under my observation during the rebellion, and which were treated as directed above, quite a number recovered, a few with ankylosis, and many others with partial motion of the joint.

SECTION VI.

Onychia.

Onychia is an inflammation of the nail matrix, and may be induced by similar causes to those of whitlow, and especially by an ingrowing nail or paring the nail down to the quick. It is chiefly found among children and young persons, and is attended by inflammation and ulceration of the adjacent parts, and occurs under two forms, the simple and malignant. *Simple* onychia begins as a circumscribed inflammation in the root of the nail, and may be excited by a prick in those persons whose systems are impaired. The affected spot is red, hot, swollen, and painful. Pus soon forms, and makes its way to the surface; the nail becomes loose, shriveled, and black; gradually it is thrown off, and a new one appears in its place, which is rough and irregular in shape.

Malignant onychia begins very much like the simple variety, but is more rapid in its course, and runs on to ulceration, which is of a most intractable kind. The inflamed spot has a dark, livid color, and degenerates into an offensive sore, with a discharge of sanious pus. In a little while, large, flabby granulations spring up, and the end of the finger or toe becomes greatly enlarged, and clubbed in appearance. The nail turns black, shrivels, and breaks off into pieces; any attempt made to reproduce a new one is very imperfect. This variety occurs, as a rule, in cachectic, strumous, or syphilitic constitutions. The entire distal phalanx of the affected finger is often blue and puffed, the pain is intense and continuous, and of a gnawing, boring character, worse at night, and its long existence wears away the patient's strength.

Treatment.—The treatment of this intractable disorder is both general and local. The local consists of a thorough evulsion of the nail, including the entire matrix, the early evacuation of the pus, and the free division of the tissues, so as to prevent further extension of the inflammation and involving the neighboring parts. After this the finger should be surrounded in a sheath of spongio-piline, made like a finger-stall, which should be applied warm and moist. If this cannot be obtained, a flaxseed

or elm poultice may be substituted, and the whole covered with oiled silk. After suppuration has ceased, the granulations which begin to form from the bottom of the wound should be touched with Nitric acid or the powdered Nitrate of Lead, which has found much favor among recent surgeons. If there is a syphilitic history connected with the disease, an ointment of *Mercurius corrosivus* or *Mercurius dulcis* will be found valuable. The constitutional treatment will consist of the administration of one or more of the following remedies, according to circumstances: *Aluminum*, *Anthracein*, *Apis mel.*, *Asafetida*, *Graphites*, *Hepar sulph.*, *Mercurius*, *Natrum sulph.*, *Fluoric acid*, *Rhus tox.*, and *Silicea* and *Sulphur*.

Special Indications.—*Alumina*. The nails are brittle, break off, with lancinating pains and tendency to ulceration of the finger phalanx; gnawing and boring beneath the finger-nails, with sensation of crawling along the arm; nails thick and brittle, with dark spots on them.

Anthracein. Violent burning pain in phalanx; absorption of pus into the blood, tendency to gangrene, with cerebral symptoms.

Asafetida. Whitlow, with violent pains and nightly exacerbations and threatening necrosis of the phalanx.

Graphites. Ingrowing toe-nail,—sides and roots of finger and toe nail become sore, ulcerate, and swell; exceedingly painful, burning and throbbing pain, with suppuration and proud flesh. If taken early, this remedy will abort the disease in a few days.

Hepar sulph. Superficial erysipelatous onychia surrounding the root of the nail; tip of finger or thumb livid, throbbing violently, with cutting, burning pain extending to the axilla; lymphatics inflamed and painful; axillary glands enlarged, patient sensitive to touch and cold; the disease recurring every winter. Before suppuration, *Hepar*; after it, *Lachesis*.

Mercurius. Inflammation in the cellular tissue beneath the cutis, involving the thecæ, tendons, and phalangeal joints; pains more throbbing than violent, more continuous than shooting; great sensitiveness to heat and cold.

Natrum sulph. A blister on the ungular phalanx, followed by deep red swelling, with suppuration at root of nail; great pain, better in the open air than in the warm room. This remedy acts better in those systems debilitated or weakened by vicious regimen and diet, and when chilly and feverish in the evening.

Fluoric acid. Sharp, penetrating pains at root of nail; sleep restless and unrefreshing; when necrosis threatens or has actually appeared.

Silicea. Affection of periosteum, heat and redness moderate; deep-seated inflammation; violent shooting pain deep in the structures, worse by heat of bed; sleeplessness at night; pain insupportable, with great restlessness and irritability; protruding proud flesh; pus acrid and discolored. It produces sloughing, and expulsion of necrosed bones. Ingrowing toe-nail.

Asafoetida and *Lachesis*, for violent night pains, threatening necrosis.

As a prophylactic, give *Apis*; if this is insufficient, follow with Sulphur.

If Arsenic fails, give *Anthracein*. If Mercurius does no good, use *Hepar*. If *Silicea* causes no improvement, give *Fluoric acid*.

If the disease begins at the root of the nails, Causticum and Graphites; before suppuration, *Hepar*, *Lachesis*; after suppuration, *Silicea* and Sulphur; margin of the nails, Lithium; under the nails, Alumina, Causticum, *Coccus Cacti*, and Sulphur; all around the nails, Alumina, *Bufo*, Causticum, *Hepar*, *Lachesis*, Mercurius, Plumbum, *Ruta*, Ferrum mag.

SECTION VII.

Affections of the Toe-Nail.

Toe-Nail Ulcer.—This distressing disease of the foot assumes the form of the irritable ulcer, and is found on the inner, and sometimes on the outer, side of the flesh adjoining the nail of the great toe. This ulcer is the result of inflammatory action, developed in part by an accidental bruise, the wearing of a tight boot, etc. In consequence of the inflammation, the skin swells and rises over the side or end of the nail, which gives it the appearance of being buried in, or growing into, the flesh. This, however, seldom takes place, it being extremely rare that its origin is attributed to the incurving of the nail, as compared with the puffing of the skin in consequence of inflammatory action.

As the inflammation increases, the soft tissues distend, the cuticle breaks, and an ulcer is formed of the irritable variety, the suffering being considerable, and kept up by the continued irrita-

tion of the edge of the nail. Sometimes the whole toe inflames, followed by suppuration and ulceration at different points about the nail, from which shoot forth fungous growths that are exceedingly painful and tender while walking; at other times the inflammation travels around the root of the nail, and involves its matrix, producing a species of *onychia*. When the inflammation extends to the bone, caries takes place, followed by destruction of the phalanx, as has been pointed out in paronychia of the fingers.

Prognosis.—In forming a prognosis of this affection, we should be cautious in expressing the opinion that it will get well without the removal of the nail, although sometimes such may be the result under careful and judicious treatment.

Treatment.—This affection being altogether a local one, occurring in most cases, it is true, in an unhealthy constitution, the proper plan of treatment will be to use both local and general means in establishing the cure.

If the toe is in an *inflamed* and *irritable* condition, and it is found unnecessary to remove the nail, the foot should first be elevated, and covered with a warm poultice of slippery-elm bark saturated in *Hypericum* or *Calendula* water, or cloths dipped in the lotion for two or three days, so as to relax the tissues and relieve the inflammation, and give internally *Fluoric acid* or *Silicea*, until the soreness and irritation have considerably abated. This will be accomplished generally in two or three days. Then scrape the top of the nail tolerably thin, and place a light packing of lint or charpie under the edge of the nail, to lift it above the sore; or, place a very small compress over the part swollen, and fasten it down by a small piece of adhesive plaster, carried around the toe and over its side, so as to force the flesh off the nail, as recommended by Dr. Meigs, of Philadelphia. An excellent plan is to cut a small, narrow strip of tin, turn over its edge so as to hook it under the nail, and then carry the piece over the nail and the edge of the toe, and fasten by a narrow strip of adhesive plaster. I have frequently succeeded in this way of getting rid of this troublesome affection when all other means failed. As the nail grows in length, it should be trimmed *only at the end*, or a V-shaped piece cut out of the center, leaving the sides intact to push back the fleshy tissue, whose tendency is to grow over the edges and continually to reproduce the very evil you are seeking to cure.

A recent little invention for the treatment of this difficulty, consists of a piece of silver or steel wire bent upon itself so as to

form a spring, which draws toward the center, having little clamps under the end to attach it to the sides of the nail. Pull out the coil and make it fast to the edge of the nail, and the constant centripetal motion arches the nail and relieves the disease.

Radical treatment is best effected by the removal of the offending nail, an operation which, before the introduction of anæsthesia, was looked upon as exceedingly painful, but which can now be performed without the patient being conscious of its removal. This may be accomplished by creating perfect anæsthesia, in the manner heretofore described while treating on that subject, and, by the use of a pair of sharp-pointed scissors, one blade of which is thrust under the nail throughout its whole length, dividing it in the center; then seize each half of the nail at its base, and twist them out in turn, taking the precaution to remove that part first which has been the cause of the trouble; after the slight hemorrhage has been checked by applications of cold water, cauterize the entire matrix from which the nail grows, then cover the part with a pledget of lint saturated in *Hypericum* water, and apply temporary dressings to preserve the lint *in situ*, and treat the sore as a simple ulcer. It will heal in ten or twelve days, and the patient be radically cured. If the evulsion be not thoroughly done and the matrix carefully cicatrized, a new nail will be liable to reproduce the disorder.

If the patient is averse to having perfect anæsthesia produced, local anæsthesia may be employed by the use of Rhigolene, as advised under that head, and the operation be proceeded with as recommended. I have frequently used this latter method with the most satisfactory results. It is highly important to completely benumb the part before removal of the nail is attempted.

Dr. Gilman* proposes a simple and immediate cure for this affection, by heating a piece of tallow in a spoon over the flame of a spirit lamp, and then pouring a few drops over the granulations. It was tried in the case of a young lady, who was unable to wear a shoe for months, with almost magical effect. Pain and tenderness were relieved at once, the granulations in a few days disappeared, the diseased parts became dry, and destitute of feeling, and the edge of the nail became so exposed as to admit of its being pared away without inconvenience. The cure was complete, and the disease never returned.

* Boston Medical and Surgical Journal, December, 1859

The process of treating this disease by *Nitric acid*, as advised under the head of Whitlow, appears to me to possess advantages equal to any of the methods hitherto described; and I see no good reason why it may not be satisfactorily adopted in the cure of this disorder, especially in those cases where the nail does not protrude into and irritate the flesh.

Perchloride of iron has been recommended by M. Wahn, and its application consists in stuffing the powdered perchloride between the edge of the nail and the ulcer. The sensibility is first considerably augmented by the process; but in a few minutes all pain is removed, and the diseased part becomes as hard as wood.

Inverted Toe-Nail.—This affection is caused by the ingrowing of the nail into the soft structures of the toe, and is generally brought about by cutting the nails too close at the sides and round the corners, which causes that part of the nail to grow faster and penetrate the flesh. Its treatment will be the same as previously recommended in the preceding article. It has been recommended to pare away the soft structures corresponding with the projecting nail, and thus permit the nail to grow without resistance, and consequent relief of all preceding symptoms.

Sub-Ungual Exostosis.—This is a disease that attacks the periosteum and bone, caused either from pressure of the boot, or injury to the last phalanx of the great toe. The phalanx enlarges, and protudes from the under surface of the nail, pressing it upward, and causing the most excruciating pain and suffering. As the osseous growth advances the more sensitive the matrix becomes, and the patient, seeking relief and finding none, consults a surgeon; and the only real relief is found in removing, not the disease alone, but the entire phalanx at its articulation. Then dress the wound with Hypericum lotion, keep the limb in a horizontal position, and the parts will very soon heal.

SECTION VIII.

Corns and Bunions.

The Bunion.—This is a swelling implicating the first joint of the great or little toe, produced by pressure or other cause, effecting a change in the position of the joint. The integuments

over the joint become enlarged and thickened; the great toe, if that is the articulation affected, becomes distorted in position, pointing obliquely across the other toes, leaving the shoe to press upon the joint. This angle, being constantly pressed upon by the boot, becomes irritated; and, for its protection, the bursa of the joint becomes enlarged, or an adventitious one forms. From time to time the bursa and projecting point become irritated and inflamed; and the morbid action, thus set up, increases until it becomes a disease of more or less magnitude. In advanced life, the synovial membranes of the joint become distorted, and secrete less fluid than in a healthy state; in a short time they become stiff, painful, and partially ankylosed; the skin thickens over the surface, and is studded with clusters of small superficial corns; the bursa becomes enlarged; the effused fluid produces swelling over the joint; pain increases; suppuration ensues, and caries of the bones or exfoliation of the joint may take place.

Treatment.—The first thing to be attended to in the beginning of this affection, is to change the direction of the toe, by wearing properly made boots. To remedy the faulty position of the toe, it has been recommended to divide the external lateral ligament of the metacarpo-phalangeal articulation, or the tendon of the adductor pollicis, or the inner head of the flexor brevis pollicis; the toe, when restored to its position, being for a time kept fixed upon an under splint. Pressure upon the bunion may be prevented, by wearing over it a circular piece of amadon spread with soap plaster, and perforated in the center with an aperture corresponding with the size of the tumor. I have found great benefit derived from the application of the Arnicated amadon or felt plaster, with a hole in the center, so as to protect the corn from pressure. If accidental inflammation be excited in the part, it may be allayed by the use of *Rhus*, *Ruta*, or *Hypericum* lotions, applied by means of a compress laid over the part, and retained by a roller. If the bursa is thickened, tender, and inflamed, after the subsidence of the inflammation, it may be painted with *Iodine* or a weak solution of *Nitric acid*.

Dr. Hornby, of Poughkeepsie, New York, reports having cured a severe case of bunion of the great toe with *Sepia* 30th.

Arnica is appropriate when the swelling and pain result from a blow or constant friction of the part.

Hypericum, when the pain is exceedingly severe and of a grinding character, as if the parts were being torn asunder.

Graphites, in chronic enlargement of the bursæ, with redness of the surrounding parts, and attended with itching. *Agaricus* is also recommended for this latter symptom.

Ruta is valuable when the pain is dull, heavy, and continuous, as if it were being squeezed or pressed upon by a heavy weight.

Hepar, *Mercury*, and *Silicea*, when there is a tendency to suppuration; *Bryonia*, when the pain is shooting, and aggravated by motion. *Lycopodium* may also prove serviceable under these circumstances.

Veratrum viride, painted on inflamed bunions, generally gives prompt and lasting relief.

Corns.—Corns consist of thickened and hypertrophied cuticle, beneath which the papillæ are enlarged and tender. When they are situated upon an exposed surface, they are hard and dry; but, when they occur between the toes, where the parts are moist by retained perspiration, they are soft and moist. They not only lie upon the dermis, but penetrate into it. When inflammation or suppuration takes place underneath a corn, it becomes exceedingly painful.

A *Callosity* is a hard, thickened state of the skin, covering a larger extent than a corn. They occasionally occur on the front of both shins, when they occasion more or less inconvenience.

The *Cause* is the pressure of tight boots, or boots too large and thick, so as to produce more or less attrition upon the joints and protruding parts of the foot. Their most frequent seat is over the prominences of bone, and usually on the outside of the little toe. They are very painful when struck or trodden upon; and, when they become acutely inflamed, they occasion great and persistent suffering.

Treatment.—The first thing to be done is to remove the cause by advising the patient to wear properly shaped boots, with wide soles, and large enough across the toes to prevent undue pressure. Then put the foot into a warm foot-bath, and soak it for half an hour, extracting the hard head of the corn with the finger-nail, or other blunt instrument. The corn should then be dressed with *Arnica* lotion, thirty drops of the mother tincture to an ounce of water, and apply the next morning a piece of *Arnicated* plaster, or paint it with *Ferrum perchloride* or *Castor oil*. Repeat this dressing several times, till the little pest is removed. The

Arnicated amadon, or felt plaster, with a hole in the center, may be worn so as to protect the corn from the pressure of the boot or shoe. Give internally one of the following remedies, according to indications: *Ant. crud.*, *Calc.*, *Sep.*, *Sil.*, *Carb. an.*, *Ignat.*, *Petrol.*, *Lyc.*, *Nit. ac.*, and *Sulph.* For boring pains, *Borax*, *Caust.*, *Natrum*, and *Phos.* For burning pains, *Calc.*, *Magn.*, *Petrol.*, *Phos. ac.*, *Sep.*, *Sil.*, and *Sulph.* For aching pains, *Ant.*, *Graph.*, *Bry.*, *Phos.*, and *Sep.* For tearing pains, *Bry.*, *Lyc.*, *Magn. mur.*, *Nat. mur.*, *Sep.*, and *Sil.* For stitching pains, *Ant.*, *Bry.*, *Calc.*, *Lyc.*, *Nat. nit.*, *Rhus*, *Sep.*, *Sil.*, *Thuja*, and *Sulph.*

SECTION IX.

Warts.

Warts, or verrucæ, are small, hard tumors, consisting of elongated and enlarged papillæ of the cutis vera, clothed with a stratum of hypertrophied and hardened cuticle, chiefly affecting the hands and face of young persons, appearing and disappearing without any appreciable cause.

Treatment is both general and local. For the latter, paint the warts two or three times daily with *Thuja* tincture, and at the same time give a dilution of the remedy internally, morning and evening. If this treatment is followed up for a week or two, it will most generally suffice to cure the disease. If *Thuja* does not answer well, substitute *Rhus* for it, and use in the same way. Internally, give *Sulphur* once a day for a week or two. It is especially indicated after other remedies have been unsuccessfully used; and then to return to the previous medicine. It is also useful to prevent the tendency to recurrence. *Dulcamara* has accomplished a good many cures, and numbers of these little growths have disappeared under its use. *Antimonium crud.* has also effected cures. *Calcarea*, *Sepia*, and *Nitric acid* have accomplished good results in disposing of these disagreeable pests.

CHAPTER XXII.

Antiseptics, and Antiseptic Dressings.

THE nature of antiseptics, and those disinfecting agents used in the ordinary practice of the physician, have been discussed in a separate chapter (Chap. XIII.), to which the reader is referred. I propose, in the present article, to transcribe entire, Professor Lister's description of his method for preparing and using his antiseptic gauze, and the manner of its application. Mr. Lister's definition of the antiseptic system of dressing is, "the dealing with surgical cases in such a way as to prevent the introduction of putrefactive influences into wounds." Several attempts have been made of late years to diminish the suppuration of wounds by the application of such agents as would control these discharges, and at the same time assist the restorative process. One of the earliest applications employed for this purpose was Priar's Balsam (Tinct. Benzoin Comp.), and by some practitioners it is used at the present time in deep wounds, with lint or oakum. Professor Sayre employs this agent quite extensively for those wounds following his operation for resection of the hip-joint.

The necessity for the discharge of the serum or plasma which is poured out from the incised surfaces immediately following operations, was insisted upon by Mr. Syme, as well as his successor, Professor Lister. This forms one of the most valuable properties of the latter's antiseptic system; and to effect this, drainage-tubes were provided by leaving a dependent opening, through which the discharges are permitted to pass out. The following is taken from the excellent work of Professor Christopher Heath on "Minor Surgery and Bandaging," and is so complete in its arrangement, and so well adapted to the purposes of this volume, that I have seen fit to copy it entire.

He says: "Professor Lister, in giving directions for the preparation of his antiseptic gauze, thus writes:

"'Invaluable as the gauze is, I greatly regret to find that its use is restricted by the high price at which it is often sold. I

will therefore now describe the manner in which it has been prepared for a long time past at the Royal Infirmary of Edinburgh, with the effect of reducing by more than half the wholesale price previously paid by the institution. First, I may remark, that the chief element of the cost is the cotton cloth, the expense of the materials with which it is charged being less than a farthing per square yard of the gauze. It is, therefore, of great importance to obtain the muslin as cheap as possible from the manufacturer; and a little saving is effected by having it unbleached. The materials used for charging the gauze are: One part of crystallized Carbolic acid, four parts of common Rosin, and four parts of solid paraffine; the last ingredient being used for the purpose of preventing undue adhesiveness. Paraffine has this advantage compared with any other substance of similar consistence with which I am acquainted; but it does not blend at all with Carbolic acid in the cold, and therefore simply dilutes the mixture of acid and Rosin, without interfering in the least with the tenacity with which the Rosin holds the acid. If, for example, we compare it with a substance like spermaceti, we find that a mixture of one part of the acid with five parts of Rosin, and five parts of spermaceti, is really much more pungent to the tongue than the five parts of Rosin and one of acid alone. For, although the former mixture contains only half the quantity of the acid, yet, the spermaceti, blending with the acid like the Rosin, but holding it less firmly, takes the acid from the mixture and gives it up to surrounding objects. Such a mixture of Rosin, spermaceti, and Carbolic acid, therefore, though admirable in consistence, would be both less mild and less permanent in action than the Rosin and acid alone. The addition of paraffine, on the other hand, has no other effect on the mixture than to render it somewhat more mild. It seems needful to point out this circumstance, because, from want of knowledge of it, modifications of the gauze have been suggested, in which the paraffine has been replaced by other materials, which cannot fail to be disadvantageous.

“In order to charge the gauze, the paraffine and Rosin are first melted together in a water-bath, after which the acid is added, and blended by stirring. The object now is to diffuse this melted mixture equably through the cotton cloth: for this purpose two things are requisite; viz., that the cotton be at a higher temperature than the melting point of the mixture, and that it be subjected to moderate pressure after receiving it. The cotton cloth,

a yard wide, is cut into six-yard lengths; and these, having been folded so as to be half a yard square, are placed into a dry hot chamber formed of two tin boxes, placed one within the other, with an interval to receive water, which is kept boiling by a fire of gas beneath, the upper edges of the boxes being connected and provided with an exit-pipe for the steam. There is also a glass tube, arranged as a gauge of the amount of the water, and the chamber has a properly fitting lid. The bottom of the chamber is strengthened with an iron plate, to enable it to bear the weight used for compressing the gauze when charged. This is a piece of wood about two inches thick, nearly fitting the chamber, covered with sheet lead, so as to make it about as heavy as a man can lift by means of two handles in the upper surface. The weight is heated along with the cotton, and is put first into the chamber, so as to leave the cotton loose for the penetration of the heat, which occupies two or three hours. The cotton, when heated, is taken out of the chamber along with the weight, and placed in a wooden box, to protect it from the cold. (It would be better to have a second hot chamber for this purpose, since in cold weather the cotton is apt to be too much cooled in spite of the protection of the wooden box.) The heated gauze is then at once charged with the melted mixture of Carbolic acid, Rosin, and paraffine, in quantity equal to the weight of the cotton fabric (or slightly less); and, in order to diffuse the liquid as equably as possible, it is sprinkled over the gauze by means of a syringe with a number of minute perforations in its extremity, the body of the syringe and the piston-rod having each a wooden handle to protect the hands of the workmen from the heat. The syringe is constructed to hold half the quantity of the mixture required for charging one piece of cloth. One folded piece being placed at the bottom of the hot chamber, its upper half is raised and turned aside, and one syringe-ful is sprinkled over the lower half. The upper half is then put back into position, and another syringe-ful is thrown on. The same process is repeated with all the other pieces of gauze, after which the weight is put into the chamber to compress the charged cotton, and the lid applied. An hour or two are then allowed to elapse, to permit the complete diffusion of the liquid, when the material is fit for use.'

"Professor Lister, who is a strong upholder of the view that organisms floating in the air are the causes of suppuration, has introduced a system of dressing wounds with Carbolic acid, com-

bined with drainage, which requires for its successful application the greatest attention to a number of minute details, and some experience in its employment.

"In order to render the atmosphere about a wound aseptic, a spray of Carbolic acid (one in forty), worked by hand, may be employed; but a more efficient plan is to employ a steam spray-producer, with a solution of one in twenty, which is reduced by the high-pressure steam to half its strength.

"The care of a steam spray-producer should be either undertaken by the house surgeon himself, or intrusted to a careful dresser, and not be left to a nurse or porter. If boiling water is put into the boiler (which should be emptied after each time of using), and the spirit lamp is in good order, a steam spray should be ready for use in ten minutes, during which time all other antiseptic arrangements necessary can be made. The 'points' through which the steam and Carbolic lotion escape, should be examined daily, and cleaned by unscrewing them and passing a fine wire *from within*. Picking the points with a pin, is the best way to spoil them. The lamp should be filled up with spirit after each time of using, and should be kept capped and clean. Every lamp should be fitted with some contrivance for lowering, without extinguishing, the light.

"The pressure of steam may be conveniently gauged by opening the safety-valve (which must not be tampered with), and the efficient working of the spray may be appreciated both by the eye and the ear. If steam alone issues, the cloud is blue and transparent; but, if the carbolic lotion is being drawn up properly, the steam will be white and opaque, and a distinct whistling sound will be produced. The antiseptic gauze, which is to form the dressing, must be kept in a covered box, lest it should absorb impurities, and is to be in eight layers, and of a size large enough to go well beyond, or, in the case of a limb, to fold round, the part to be operated on. Between the two outer layers of the dressing should be a piece of water-proof 'hat lining,' with the water-proof side inward. Bandages of the gauze should be employed, and be secured with 'safety-pins,' and some loose gauze provided to fill up corners, which may be economically made out of unsoiled portions of bandages. A broad elastic webbing bandage may be advantageously used over all in cases where the dressings are liable to disturbance from the patient's movements; e. g., in the neck. The prepared oil silk called 'pro-

fective is used, after being dipped in a Carbolic solution, to protect the edges of a wound, or the surface of an ulcer, from the direct contact of the dressings. Ligatures of Carbolized catgut are employed to secure all bleeding vessels, and sutures of silk dipped in a mixture of melted beeswax with a tenth part of Carbolic acid, unless metal ones are preferred, which should be dipped in a Carbolic lotion before use. The skin in the neighborhood of a wound which is to be treated antiseptically must be carefully washed with Carbolic lotion, one to twenty; and, when the part has been exposed to unhealthy influences, it is well to wrap it up for some hours prior to an operation, in a towel dipped in the same lotion. The fingers—and in some cases the hands—of all assistants should be dipped in this solution before the operation is commenced, and all instruments should be placed in a shallow tray of the same lotion. It is convenient to have two or three pieces of linen well soaked in the lotion at hand as 'guards,' to be applied during any pause in the operation, or while some alteration in the position of the patient is being made.

"Drainage-tubes of perforated India-rubber, of various calibers, should be thoroughly soaked in Carbolic lotion for at least forty-eight hours before being used, and should have a thread attached to one end to prevent disappearance within the edges of the wound. For the purpose of introducing a drainage-tube into a sinus, a slender pair of dressing-forceps may be conveniently employed.

"In the case of compound fractures, a strong watery solution of Carbolic acid (one part of the crystals to twenty of water, or, in the case of recent injuries, a solution of half that strength) is to be injected into the wound, and thoroughly squeezed into its recesses. This may be repeated more than once in the case of complicated wounds; e. g., fractures into joints.

"All hemorrhage having ceased, the edges of a wound are to be brought together with sutures, deep wire ones being employed to take off tension, if necessary. A sufficient number of drainage-tubes being then inserted, the projecting portions are cut off level with the surface, and a layer of 'protective' applied, with holes cut to fit over the tubes. Over this are to be placed several layers of the gauze, wrung as dry as possible out of one in twenty Carbolic solution, and fastened on with a gauze bandage. The gauze dressing of eight layers is then to be wrapped round the limb, and to extend to six inches both above and below the wound, and, being folded carefully round, is to be thoroughly bandaged.

"The antiseptic dressings are to be changed on the next day, with the following precautions: A stream of watery solution of Carbolic acid (one to forty) is thrown beneath the gauze while it is being removed, and then made to play upon the wound till a piece of calico, soaked with the same lotion, has been placed upon it by an assistant, as a temporary security until the dressing is re-applied. Any examination of the wound that may be desired can be made while the solution is being played over it. The drainage-tube can be removed, cleansed and shortened, or may be washed out *in situ* with a syringe. Fresh 'protective' and a new gauze dressing should be applied, with all the precautions taken before.

"The intervals between the dressings should be regulated by the amount of the discharge; for the more copious it is, the sooner does it exhaust the Carbolic acid in the gauze. The Rosin will retain enough Carbolic acid for twenty-four hours, however free the discharge may be; and, if the stain on the cloths is slight, the gauze may be safely left for two days; and, if there be hardly any, the dressings need not be changed for a week."

Dry Dressings.—Dry dressings are often employed by practitioners in cases of small import, when a tendency exists to produce immediate union of the divided surfaces. In cuts or superficial wounds,—as harelip, ligation of small arteries, etc.,—the first dressings of a wound may be dry. To effect this a few strips of adhesive plaster or lint may be applied, for the purpose of drawing the lips of the wound together or producing a scab, as a protection to the granulations proliferating beneath. To re-apply these dressings, great care must be employed that no injury is done to the fresh adhesions that are attached to lint or plaster. The best method, therefore, is to soak them off with tepid *Hypericum* water, using cautionary means for the preservation of the delicately formed granulations that are joining and gluing together the divided edges.

Strapping.—This is best accomplished by the common adhesive, soap, or India-rubber plaster. The soap plaster is the least irritating to the skin, and may be applied in all cases where the texture of the skin is delicate and sensitive. In diseases of the joints it will often be found advantageous, when pressure is required for the purpose of absorption, to use a stronger material, such as the stout twilled calico plaster, which is considerably

tougher than the ordinary variety. In certain diseases, Belladonna, Conium, or Mercurial plaster may be employed when the action of these agents is required locally.

To apply straps properly, they should be cut parallel with the fiber of the cloth, using the length rather than the width of the material, to give support and cohesion to the tissues. Straps made by cutting them *across* the fiber yield little or no support to the structures; as they soon relax their hold, and yield readily to the force employed. When used to hold together cut surfaces, they should be applied long enough to embrace considerable tissue beyond, so as to give firm hold and support to the structures. In certain cases they may be carried completely around the limb, but not tight enough to interfere with the circulation. This is exemplified in the strapping of an ulcerated limb. The *dry strap of Mr. Packard* is a valuable improvement in dressing superficial cuts on the exposed portions of the body, as the lips of the wound can be accurately adjusted without the use of the ligature. This is done by cutting a piece of adhesive plaster the length of the wound, and one and a half or two inches deep. This is applied so that one edge lies parallel with the wound, and the other is attached to the tissues beyond. When one is firmly held, apply the other on the opposite side of the cut; then sew the two edges together, which brings the lips of the wound in close apposition, and holds them so without a suture passed through the tissues. In cases where close and immediate union is required, and to prevent scarring, this is a most valuable dressing. The number of straps applied will depend upon the magnitude of the wound. One thing should be ever in the mind of the practitioner, and that is to have the traction of the plaster always *upward*; and this can be accomplished by affixing the strip to the lower edge of a wound first. The removing of these strips from a wound or injured surface should be done with great care, to avoid opening afresh the sundered surfaces. To avoid this the plaster should be removed by the ends toward the center or the covering of the wound, which should be detached lastly and gently.

In some cases, strapping should be applied so as to cover the wound entirely: this can be accomplished by cutting the plaster in narrow strips and applying them as is done by the use of the ordinary roller, permitting each strip to slightly overlap the preceding. These may be crossed at right angles by other strips, if more tension and solidity are required. When a greater

amount of traction is needed, as in plastic operations, the invaginated adhesive bandage may be employed: this consists of two or more strips of long plaster of different widths, the narrow one passing through a transverse slit in the wider one, so as to draw the structures to a close adaptation.

Straps should be changed frequently: if they become discolored or blackened by contact with the discharges from a wound, gently rubbing them first with a little Olive oil or vinegar, and the subsequent application of Castile soap and water, will remove all the stains. The same process may be employed by the practitioner to remove the sticky, glutinous material that clings to the fingers in applying adhesive strips.

In the application of straps, care should be used to see that they lie closely to the part; this may be assisted by using a piece of muslin or cloth to soak up the excess of moisture and to cause it to lie closely pressed to the skin. Before using plaster strips, the piece should be cleansed from dust, and heat applied by the use of a sponge dipped into hot water, squeezed out, and applied to the plaster surface, or by holding the plain surface of the plaster in contact with a pan or pitcher of hot water.

Medicated Water Dressings. — These are of almost universal application, and are one of the most valuable auxiliaries in the treatment of local diseases, and sometimes aggravated disorders of the internal viscera. To apply these curative agents externally, fold a piece of lint two or more times, according to the indications to be fulfilled. If you require the curative properties of the remedy for some internal disturbance, with heat and moisture, apply a thick medicated compress as hot as the patient can bear, and cover it over with a piece of oiled silk or India-rubber cloth, and renew as occasion demands. For local dressings, to be applied warm or cold, as the practitioner may desire, take a double fold of lint, have it soaked in the medicated water, and apply to the part. If it is wished to keep the part cool, mix a little Alcohol with the water, for the purpose of a more perfect evaporation, and let the dressings be light and thin. If heat is required, use the lint with the remedy to be employed hot; have the compress thick, and covered all over with oiled silk or India-rubber cloth. The water-proof covering should be slightly larger than the lint dressings, and may be preserved in its place by straps of adhesive plaster, or a well-applied roller.

Absorbent Dressings.—These dressings are valuable in deep discharging wounds, where it is intended that the discharges shall be freely absorbed by introducing the material into them. Cotton fails to absorb the pus and secretions, and in many cases acts as a plug, preventing the escape of the pent-up matter. Charpie, or lint made from old towels and tablecloths, is better than the patent lint. Fine tow, or marine lint made of oakum which has been saturated with tar, or fabricated from the fibers of old tarred ropes, absorbs more freely than the previous material, and has met with great favor among surgeons for dressings of extensive or deep-seated wounds. Marine lint possesses both the antiseptic and astringent properties of the tar acids with which it is saturated. It is purchased in packages, is of a coarse fiber, and is really a dressing of great value; besides these virtues which it possesses, it has the additional advantage of being much cheaper than lint or the absorbent cotton. Oakum, "Marine lint," and "Tenax," all of which are modifications of the same material, may be advantageously inclosed in a layer of Lister's antiseptic gauze, which prevents entanglement of the fibers in the wound, while at the same time it does not interfere with the absorption of the secretions. It has been employed to cover over stumps after amputation; and Professor Helmuth uses it in the form of a cushion, to rest stumps upon after amputation. It can be retained in position by means of the ordinary roller.

Guerin's Cotton-Wool Dressing.—This is a dry dressing, consisting only of a large wad of cotton-wool, bandaged firmly around a wound, and there closely held in position. Mr. Guerin left it thus applied for weeks. This dressing has been largely used in the University College Hospital, London, with marked success, by Mr. Arthur Barker, with the following modifications: First bake the wool for hours in an oven of the temperature between 300° and 400° F.; then wash the limb thoroughly with Carbolic lotion, just previous to the operation, as also all instruments used for it, as well as the hands of the operator and assistants. "Every precaution is taken except the *spray*. The vessels are secured with Carbolized catgut; and, the wound and end of the stump having been wiped over with ten per cent Carbolic oil, the former is stitched in the usual way, a drainage-tube being first inserted. Over the end of the stump is placed a piece of lint dipped in Carbolic oil. The cotton-wool, spread evenly on a towel to the depth

of about the thickness of the limb, immediately before use, is passed under the stump, and then folded up over the end and along its upper surface, so as to completely envelop it. It is now bandaged very firmly and evenly as far up the limb as convenient or possible." Mr. Barker says, that "an amputation thus treated may be left untouched for eight or ten days without any marked rise of temperature or offensive odor from the dressing. Should either of these appear, it is taken down and re-dressed, the drainage-tube and stitches having been removed."

Boracic Acid Dressing.—The following is taken from the London *Lancet* of December 20, 1879, and is a portion of a lecture delivered by Mr. Lister, to illustrate his peculiar method of skin grafting beneath this kind of dressing. He says: "The large, callous, and foul sore, having been dressed for a few days with moist Boracic lint covered with gutta-percha tissue, was purified completely by sprinkling the surface lightly with the powder of Iodoform, after washing the surrounding epidermis with strong watery solution of Boracic acid. Prepared oiled silk (protective), dipped in Boracic lotion, was then applied to the sore, and covered with Boracic lint, overlapping well in every direction. A similar dressing of oiled silk and Boracic lint was applied every third or fourth day, until the granulations had assumed thoroughly healthy characters; when skin grafting was performed by shaving a thin slice, about quarter of an inch across, consisting of a little more than epidermis, from the inner side of the upper arm, which had been washed with a one to forty watery solution of Carbolic acid, cutting this into small pieces on the thumb-nail, and placing each, with the raw surface downward, on the granulations, each graft being covered, as it was deposited, with a little bit of the oiled silk, rather larger than the sore, dipped in Boric lotion. A general piece of the oiled silk, rather larger than the sore, was then applied, and over this Boric lint in two layers, secured with a bandage. This dressing was left untouched for a whole week, so as to allow the grafts a long period without mechanical disturbance."

The Bordeaux Dressing.—This dressing was originated at the city of the same name in the southern part of France, by Dr. Azam, who claimed that he could cure his patients in less than half the time occupied by Dr. Guerin's method. It is thus described by Professor Helmuth, in his *System of Surgery*, page 238: "After the operation has been performed and all hemorrhage controlled

in the usual manner, a good-sized drainage-tube is laid in the deep portion of the wound, and fastened to the limb. The bases of the flaps are then united with quilled sutures of fine silver wire, as many as are necessary to hold the wound firmly, each from one and a half to two inches from the edges of the flaps. The edges of the wound are then held together with figure-of-8 suture or hare-lip pins, supported by strips of charpie dipped in Collodion. The limb is then wrapped in wadding, except where the drainage-tubes emerge, the ends of which are covered with charpie to absorb the discharge.

"The harelip pins may be removed on the second or third day, and the deep sutures may be loosened then or a day or two later. The dressings should be renewed as in ordinary cases, and cicatrization will usually be perfect in from ten to twenty-five days. Under Dr. Azam's care an amputation of the leg healed in eleven days, and one of the thigh in ten days.

"Three important points are to be observed in the application of this method:

1. A drainage-tube at the bottom of the wound, through which the blood and serum run out.
2. The deep sutures which are to hold in contact that portion of the wound.
3. The superficial sutures for the approximation of the margins of the wound."

This is one of the most valuable methods of dressing; and, I believe, will largely supersede all other dressings, not excepting that of the greatly famed Lister. It bears with it all the evidences that meet the indications to be fulfilled by the healing of wounds by first intention: the two surfaces being held together in such close relation; the drainage-tube to carry off the accumulating discharges, favoring union by adhesion, and the entire freedom from contact with the wounded surface of the dressings employed by Mr. Lister, Guerin, and others, taken together, put this method as the very paragon of modern dressings.

In 202 amputations where this method of dressing was employed, there were but twelve fatal cases, although sixty-three of them were of the lower limbs.

Hypericum Dressings.—These are the best dressings that I have ever employed in surgical practice, especially after amputations, and the deep wounds that are the result of the major

operations. I have employed this treatment, following amputations of the lower limbs, with a good share of success, so far as I have gone. After an amputation of a limb, and all hemorrhage has ceased, wait a few minutes for the plastic lymph to cover the surface of the wound; then closely adapt the flaps with deep-seated ligatures of Carbolized catgut, the edges of the wound to be carefully adjusted by the silver wire suture. A drainage-tube of soft rubber, laid in Carbolized oil for several hours before its application, is placed at the base of the wound, extending from the central surface of the limb to a depending position, where it is secured to the limb. Then dip a piece of patent lint, or compress of clean old toweling, into a mixture of Glycerine and tincture of Hypericum, two parts of Glycerine to one part of Hypericum, and apply it over the entire stump, fitting it carefully, and pressing it close to the external surface of the wound, leaving an opening at the point of emergence of the drainage-tube. Cover with oiled silk, and put a roller bandage over all, having first placed a piece of felt upon the two flaps, covering over nearly two-thirds the diameter of the limb; press the flaps carefully together, and elevate the limb by placing it upon a hair or tow pillow. I can confidently recommend this dressing as having proved itself most valuable in my hands, in the not extensive practice in which I have employed it. In one case, an amputation of the leg was cured in a remarkably short space of time, no untoward symptom having developed throughout the course of treatment. In a case of bilateral lithotomy, in which I removed quite a large calculus, within the past month, the best results were obtained by the use of the Hypericum dressing.

Drainage-Tubes. — Drainage-tubes of soft India-rubber, perforated with a number of holes, and applied to deep wounds, are of the most essential importance; as they secure the free discharge of secretions from the wound, and prevent the extension of the inflammatory process by the exudations thrown off. They are used of different sizes, depending upon the quantity of discharge anticipated, from the size of a crow quill to that of the little finger. The holes should be made large enough to admit easily the thickened pus that is formed in healthy wounds. In placing a drainage-tube in a wound, the inner part should be placed near the center of the wound or flap, and the outer end on a level with the skin, where it is readily maintained by two pieces

of silk, passed through opposite points of the edge of the tube, and carried along the surface of the limb, where they are firmly held in position by one or two strips of adhesive plaster. Mr. Heath fastens the tube in the following way: "Two pieces of silk passed with a needle through two opposite points of the edge of the tube, the ends of each thread *being knotted at a distance of one or two inches from the tube*, are placed straight upon the skin, one at each side. The knots excite friction upon the dressing bound down upon them, and prevent the tube from being pushed in, while the dressing itself keeps it from protruding, so that the orifice lies flush with the integument." In placing the tube obliquely, as occurs in some instances, its end of emergence should be cut obliquely; else it may become blocked up, or buried within the wound.

In certain cases, it is recommended that the drainage-tube be passed through the wound, and its two ends tied together by means of a silk ligature. This permits removal and cleansing of the tube, and replacement with the greatest ease.

Irrigation.—This method of treating wounds is used to diminish the amount of heat within a wounded part. To be of service, it must be kept up till all evidences of inflammation have passed away.—See "Irrigation," pp. 49 and 50.

Ointments.—Ointments are those applications wherein certain remedial agents are employed, mixed with simple cerate, Olive oil and bees-wax, or mutton or beef tallow. They are to be applied when used on lint or muslin, and laid over the wound or other part they are intended to cover. It is rarely necessary that this kind of dressing should be applied to wounded surfaces, when we possess so many and valuable water or Alcohol and water dressings, either of which possess more healing action than the greasy appliances grouped under this head.

CHAPTER XXIII.

F r a c t u r e s .

SECTION I.

General Considerations.

THERE is no class of injuries that demand of the practitioner a greater amount of skill, self-reliance, or more mechanical ingenuity for their successful treatment than fractures. Often of difficult diagnosis, and extremely troublesome to manage, they constitute, says Gross, the most trying, perplexing part of surgery to practice creditably and successfully. As for myself, he adds, "I never treat a case of fracture, however simple, without a feeling of the deepest anxiety in regard to the ultimate issue; I cannot retire at night or rise in the morning without a sense of discomfort, so long as I am conscious, that, despite my most assiduous attention, and my best-directed efforts, my patient is likely to become deformed and lame for life." With such an appreciation of the difficulties and perplexities that surround this subject, as enunciated by this great surgeon, it is not a matter of surprise that so many crooked and ill-shaped limbs stare at us on every side. With the greatest care and attention of the practitioner, and with the most consummate knowledge of anatomy that he may possess, it often happens that an unsightly limb is the result of his most careful manipulation. It should be the aim of the surgeon, therefore, in every case, to call to his aid all the skill, anatomical knowledge, and mechanical ingenuity in his power, to effect a result not only gratifying to the patient, but creditable to the profession.

This can only be effected by the most attentive and scientific consideration of each individual case, with a thorough knowledge of the anatomical situation of implicated parts, and skillful management of the patient throughout. Even under the most favorable circumstances, cases will arise which are almost impossible to cure without some deformity or impairment of function. Experience teaches us, that in those severe and complicated fractures

involving joints, such unfavorable results will sometimes follow, notwithstanding the greatest care and skill of the surgical attendant. Our great aim should be, however, to make these unfavorable results as few as possible, and, by the large number of successful and creditable cures, largely overshadow the evil by the good. In this way, surgery can be lifted beyond the power of injury from designing men, and cases of malpractice rendered few and far between.

When a case terminates unfavorably, even in the hands of the most skillful surgeon, sometimes, the friends of the patient, tempted either with cupidity or revenge, cannot find language too harsh, or denunciations too severe, to injure the professional standing of the medical attendant, though he may not be deserving of blame. The community are too apt to judge of a surgeon's ability by the result of a single case; that is, if it terminates favorably, he has achieved a "good cure;" but, if the limb be deformed, it is imputed to want of skill, inattention, etc. As a principle, nothing can be further from the truth, or be productive of more mischief, than this kind of "*post hoc, propter hoc*" reasoning. It is this hypothetical and irrational logic that fosters malpractice suits in our courts, and which so often, among intelligent juries, compensates the plaintiff with the verdict of "one cent damages."

Etiology.—The causes of fracture are divided into the *predisposing* and *exciting*.

Predisposing Causes.—All those circumstances which render the bones more liable than usual to be broken, are termed predisposing causes. Among these may be enumerated, influence of age, which increases the brittleness of bones as we advance in life; the prolonged disuse of any limb; certain diseases, as cancer, syphilis, scurvy, and rickets, gout and rheumatism; original conformation,—the bones of some people being exceedingly brittle, without any appreciable cause.

Exciting Causes.—The exciting causes of fracture are twofold, mechanical violence and muscular contraction. The former is the most common, and may act upon a bone *directly*, as when a fracture is produced at the part to which the violence is actually applied. It is said to be *indirect*, when a force is applied to two portions of a bone at the same moment, the fracture taking place at a point between. This is exemplified by a fracture of the radius

by a fall upon the hand, or in a case of fracture of the clavicle by a fall upon the shoulder. In old people, the neck of the femur is frequently broken by stepping carelessly upon the floor, or by the merest twist of the limb in bed.

It is rarely that a bone is fractured by muscular action. Professor Gross records three cases of this accident, in two of which the subjects were remarkable for health and muscular development; and the fracture in each was produced by feats of strength, in which the elbows were held upon a counter, their hands interlocked, and the effort made by each to push the other's arm over upon the counter; in the third case, the arm was broken in the act of throwing a chip.

It occasionally happens that a fracture is partial, where a part only of the fibers are broken, the rest bending to the force. This is called the *green stick fracture*.

SECTION II.

The Two Classes of Fractures.

Fractures are of two kinds, *simple* and *compound*; the latter, however, is subdivided according to the character and extent of the injury, such as *comminuted*, *complicated*, and *impacted*.

A fracture may be defined as a solution of continuity in the osseous tissue, and may be either transverse, oblique, or longitudinal. It is said to be *simple*, when it is unaccompanied by any lesion of the soft parts; and *compound*, when a wound communicates with the fractured part. A *comminuted* fracture is that in which the bone is broken into a number of pieces. A *complicated* fracture is when the injury is associated with hemorrhage, laceration of vessels or nerves, or other damage done to the surrounding tissues; and an *impacted* fracture signifies that the extremity of one fragment is forced into that of the other.

I.—Simple Fractures.

The symptoms of fracture are divided into two classes,—the *rational* and *physical*.

The rational are easy of recognition, and consist of pain, more or less acute, impairment of function and deranged sensibility of the affected limb, caused by pressure of the fragments upon the nerves of the part.

The *physical* symptoms are: *Crepitus* and *preternatural mobility* and *deformity of the part*. *Crepitus* is that peculiar grating sensation, produced by rubbing two broken extremities of bone against each other. The *crepitus* of fracture must not be mistaken for that *moist crepitus* which is the result of effusion of lymph into the surrounding tissues, or the presence of air in the areolar tissues.

The amount of constitutional disturbance in fracture depends upon its extent and the peculiarity of the individual, and varies from the slightest exaltation of normal action to the most intense excitement. In many cases there is an entire absence of traumatic fever, while in others all the functions of the body undergo marked and persistent derangement.

Prognosis.—The prognosis of fracture will depend upon the age, constitution, and habits of the patient, his obedience to treatment, and the nature and extent of the injury.

As a rule, fractures in aged persons unite more tardily than in the young. The bone that is broken, and the line of the fracture, influences, more or less, the result of the case; thus, fracture of single bones, as the femur and humerus, situated between large and powerful muscles, are more difficult to treat successfully and without deformity, than where it occurs in the fore-arm or leg, a single bone only being broken; since in the latter case the sound bone acts as a splint to keep the parts at rest, and prevent shortening.

The social position of the patient also influences the result; thus, the laboring classes, with strong and robust frames, do better, *ceteris paribus*, than the wealthy, whose constitutions are often debilitated by intemperance and luxurious modes of living. The relation of the fracture to certain cavities has its weight in the prognosis; hence fractures of the pelvic bones, in consequence of the viscera being affected thereby, are more serious in their termination than those of the extremities.

In all fractures, therefore, the prognosis should be guarded; as the result from serious and unlooked-for causes may produce a consequence very different from that which was anticipated. Throughout the conduct of the case, the surgeon's duty is to foresee, if possible, threatening complications, and to bestow that skill and attention upon the patient that will result in a perfect cure as far as it is possible to be attained. If the result should

be unfavorable, despite all such care and assiduity on the surgeon's part, he cannot equitably be held for any accountability in the matter. He alone should be answerable to the law, who is not only ignorant of the principles of treatment in such cases, but who is notoriously negligent of his patient's best interests.

Process of Repair.—The first few days after fracture, there occurs a period of repose, with little or no change taking place, except, perhaps, the effusion of small quantities of serum and lymph, and the absorption of blood that may have been extravasated; pain subsides, and the tendency to spasmodic action disappears. Any traumatic fever that may have been present has yielded, and the parts are ready to take on the reparative process.

First Stage, or Uniting Period.—At the beginning of this stage, the ends of the broken bones, the periosteum, and neighboring tissues are found to be abnormally red, injected with blood, and covered by plastic matter, resembling in consistence and appearance a thick solution of isinglass. It is most abundant upon the surface of the bones, but is effused between the periosteum and the muscles, and in the muscles themselves; all these structures being more or less actively engaged in the process of repair. A similar substance, but in less abundance, is thrown out within the medullary canal, the lining membrane of which is in a state of inflammation, as is evinced by the injection of its vessels and discoloration. This is the period properly known as the "knitting" period; during which the patient feels a peculiar sensation which is popularly attributed to the "knitting" of the bone.

In the latter part of this stage begins the *period of development*, or modeling process, in which the lymph is converted, first, into fibrous tissue, then into cartilage, and finally into bone; or, more correctly speaking, cells are developed by proliferation in the new substance, into which the osseous granules are deposited, the whole process resembling that in which bone is originally formed.

The traumatic irritation propagated from the broken bone causes swelling of the periosteum, active proliferation, and formation of a sheath of new bone around the seat of fracture, which constitutes the "*ensheathing*" or "*ring callus*" of surgical writers.

The medulla at the same time participates in the action going on, and becomes hardened and partly ossified, which constitutes the "interior" or "pin callus." At this time, the osseous structure itself undergoes cell proliferation; and union of the fragments takes place by the same process already mentioned in considering wounds of the soft tissues. The new material which is developed between the ends of the broken bones by the osteogenetic layer of periosteum, is called the *intermediate, permanent, or definite callus*, in contradistinction to the *ensheathing* and *interior* forms of callus, which are *temporary or provisional*.*

The time required to complete this process, varies from four to ten weeks, being proportionately less as the patient is younger and healthier, especially so if the fracture is nicely adjusted and kept at perfect rest. The last stage in the process of repair consists in the absorption of superfluous bone and the restoration of the medullary cavities, and is generally completed in from seven to twelve months. The material by which fractures are consolidated was called by the older pathologists, *callus*, in consideration of its density, which, when the process of repair is completed, is fully as hard as bone. (Fig. 128.)

Fig. 128.



If the ends are not accurately adjusted, the interspaces are filled up by this material, as is shown in the cut. The figure also exhibits the formation of what is termed a *provisional callus*; that is to say, a ferrule of new bone, encircling both extremities for a little distance above and below, so as to splice them together until they can be more firmly held by the *ensheathing* or *permanent callus*, as it is termed. The permanent callus becomes so by the absorption of its more superficial portions at first, and gradually the deeper, until the broken bone not only regains its pristine form and color, but also its smoothness; so that in a well-

* Billroth, however, explains this process differently. According to this distinguished surgeon, the periosteum possesses no peculiar osteogenetic power, the formation of callus being due, not to proliferation of previously existing cells, but to an accumulation of *wandering cells*, which he considers as white blood-corpuscles escaped from the vessels, and aggregating together so as to form bone.

adjusted fracture nothing will remain to denote the existence of fracture, save a little seam or ridge corresponding with the line of junction of the two fragments.

It will thus be seen that the office of the provisional callus corresponds with the plasma effused between the cut surfaces of a wound, which disappears as soon as its office of firmly uniting the cut edges together has been accomplished.

In fractures that are perfectly adjusted and maintained *in situ*, there is little need of provisional callus, the ends of the broken fragments uniting like wounds in the soft tissues, almost by the first intention. It is seldom, however, that a fracture is so perfectly coaptated as not to require the assistance of this provisional callus, as the numerous specimens in the museums of our medical colleges will abundantly testify.

Treatment.—The leading indications in the treatment of fracture are to procure reunion and to prevent deformity. This is to be effected by placing the fragments in their natural position, and maintaining them in perfect contact, and at complete rest, until they shall have firmly united. The first thing required, however, says a distinguished author, "is to carry the patient to his house or to a hospital, gently and on a litter, with both legs tied securely together at the knee and ankle, if it be a fracture of the lower extremity, so that there may be no chance of the broken bone being thrust through the skin." A litter may be made of a couple of poles, covered over with a sack; or the patient may be placed upon a narrow door, or long shutter, or two pieces of board; or he may be conveyed in a spring furniture car, or whatever other mode may be considered expedient.

Various *fracture-beds* have been invented by surgeons; but for all practical purposes I believe that the simple hair or moss mattress, tufted firmly and laid upon a board bottom, to afford an even surface and secure firmness to the whole arrangement, and a bedpan to receive the fecal evacuations, is all that need be desired under ordinary circumstances. If long confinement be anticipated, or if the patient has been worn out by previous disease, an air mattress may be substituted, in order to prevent bedsores.

The bed upon which the patient is to lie should be made as firm and *level as possible*. A comfortable bed, says Gross, "is, to a man with a broken thigh or leg, an indispensable article; and

the practitioner who fails to give the proper instructions respecting it, is guilty of a gross dereliction of duty." After arranging the patient comfortably in bed, he should be undressed, thoroughly examined, and washed from head to foot, and dried with a coarse towel. The limb should now be placed in a position of muscular relaxation, and attention given to the setting of the bone. To accomplish this, the upper end of the limb must be held steadily by an assistant, while the lower is extended, or firmly and gently drawn in such a direction as to restore the limb to its proper length and shape; the surgeon in the mean time adapting the fragments to their correct position, by manipulation with his fingers. To prevent pain and spasm, chloroform or other anæsthetic should be administered during the setting of the fractured bone. The limb should be carefully bandaged from its extremity to a considerable distance above the point of injury, for the purpose of preventing swelling, and confining the muscles that they may not contract, and disturb the healing process.

Apparatus.—After adjusting the fractured limb, it is necessary to employ some mechanical contrivances to preserve the limb in its natural length and shape, and prevent motion at the fractured part. The means employed for this purpose are *splints, cushions, bandages, and adhesive strips.*

Splints are made of various materials, as wood, trunk-board, leather, felt, gutta-percha, tin, and iron, either being selected in accordance with the fancy, caprice, or personal experience of the practitioner. In fracture of the thigh and leg, especially in that form which requires permanent extension and counter-extension, splints of wood, adapted to the size and shape of the limb, have been found of most service. In fracture of the upper extremity, splints made of binder's or trunk board, dipped in hot water and molded to the form of the limb, answer an excellent purpose. Professor Gross recommends "*uncoiled* leather and felt, the latter being rendered stiff by gum shellac, which make excellent splints, and which I have often used with much satisfaction in fractures both of the upper and lower extremities." Previous to their application, they should be softened in hot water, all angularities cut off, and then be molded and adapted to the injured limb.

The *gutta-percha* splints are extensively used, on account of their lightness, neatness, and the ease with which they are applied. When cut to the proper size, and dipped into hot water, they may be easily molded to the form of the part for which

they are intended, which upon cooling they always retain. Like other splints, they should be well lined with wadding or linen, to prevent irritation of the skin.

Dr. W. B. James, of Philadelphia, has devised an ingenious splint for fractures of the upper extremity, which, from its simplicity, durability, and adaptability to the parts interested in such fractures, is deserving of attention. The material of the splint is vulcanite, and is thus described by the author: "It is hard, like a piece of board; but, by holding it over a lighted candle, or by subjecting it to the heat of a bright fire, you can heat it up so that it will bend in any direction. By plunging it into cold water, it is set immediately. There is no trouble in molding it so as to fit any part of the body. You can give it the proper curves almost immediately, after a little experience. Take two splints, prepared and adapted to the limb, and make a series of holes along the corresponding edges of each, so that they can be laced up like a shoe, which may be tightened or loosened, according to the exigencies of the case. Along the other corresponding edges, make a row of double loops. In applying it, attach a long string or lace to one end of the row of loops, and run it through the double series of loops, having taken the precaution of interposing between the limb and splint some such material as gun-cotton, or other soft substance, to preserve uniform pressure and prevent abrasion of the skin." It does not interfere with ventilation to the arm; can be tightened or loosened in a moment; is light, and in other respects well adapted to both simple and compound fractures.

The material of which the splint is composed is of less consequence than the mode of its application. Two points require our particular attention; viz., that the splint is sufficiently broad to extend to the external line of the limb and not press upon it, and that it embrace the two joints connected with the fractured bone. By inattention to these rules, much deformity often results. Fracture-cushions are usually made in the form of small bags, which are filled with *bran, chaff, cotton, straw, tow, or horse hair*. They are used to fill up the inequalities between the splint and limb, and must vary in shape and thickness, according to the requirements of each particular case. Instead of cushions, pads are often used, the best of which are made of old blankets, cut into strips long and wide enough to line the splints; and a sufficient number should be laid on so as to press exactly where the surgeon desires it.

Dr. Gross first called the attention of the profession to the use of the adhesive strips, which are now much employed in the treatment of fractures as retentive means, or for the purpose of maintaining extension and counter-extension. Dr. John Swinburn treats fractures of the long bones almost exclusively with the aid of these strips, dispensing with the roller, and often even with splints. The fracture bandage or roller is an agent of good or evil, according to its use, and should be cautiously employed in the early stage of fracture; should be always used in the second dressing when preparing the limb for the starch bandage. When employed, it should consist of coarse linen or muslin, and never be made of new cloth, but of cloth that has been washed to rid it of its starch. The bandage most commonly used is the ordinary single-headed roller, of a length and breadth suitable to the affected limb to which it is to be applied. The object of the bandage is twofold; to afford uniform compression of the limb, and the better to prevent swelling and spasm. In its application, the rule is to begin at the remote part of the limb, and proceed upward to some distance above the seat of the fracture, care being taken to apply it sufficiently tight to fulfill the object for which it is designed, as shown in Fig. 129, when applied to the leg.

Fig. 129.



Everything being in readiness, the next duty of the surgeon is to reduce the fracture and bring the fragments to their natural position. This should always be accomplished as soon after the accident as possible; as at that time the muscles will offer

less resistance. The reduction may be accomplished by manipulation, pressure, and counter-pressure; or by extension and counter-extension,—according to the part injured: the former often being all that will be required in fractures of the upper extremity, jaw, and nose; while the latter will be for all fractures of the thigh and leg, and at times for the arm and fore-arm. The extension is usually made upon that portion of the limb which is articulated with the lower fragment, and the counter-extension upon that which is articulated with the upper. When the fracture occurs in a child or feeble person, where but little muscular resistance is present, the extension and counter-extension may be applied directly to the two fragments of the bone.

Extension should always be made slowly and gradually; as in that manner we may the better overcome the spasmodic action of the muscle. The degree of force will vary according to the character of the displacement; but it should always be sufficient to remove the shortening of the limb, and overcome every obstacle which opposes the reduction. Reduction having been accomplished, the fragments are pressed into their natural position, and retained there by the application of splints and bandages. If the fracture occupies the superior extremity, a sling should be used to support the fore-arm and hand; after which the patient is able to walk about, recline, or sit, as he may prefer. But, if the fracture occupy the thigh or leg, it will be necessary for the patient to remain in bed until the fragments have become united, or until the swelling and inflammation have so far subsided as to admit of the application of the starch bandage, to be applied as directed. During this time, the limb should be placed in such a position as to relax and rest the muscles which pass over the fracture, extension and counter-extension being at the same time kept up by the use of proper appliances.

Special Apparatus.—In addition to the apparatus already described, much benefit may be derived from the use of a bandage previously moistened by some mucilaginous solution, which upon drying forms an unmovable case for the limb. Surgeons do not agree upon the substance to be used for moistening the bandage; but, so long as the object is gained, it matters little what substance is employed. Cooper, an English surgeon, employed bandages saturated with a mixture of the albuminous part of eggs, and wheat flour. Lawrence used powdered

chalk instead of the flour; Velpeau used dextrine; Smee, gum arabic and whiting. Gum shellac, glue, and plaster of Paris have also been highly recommended. Seutin was the first to recommend the use of starch, which is the substance generally employed by the surgeons in this country. The advantages of this bandage are that it takes the shape of the limb accurately, and maintains the fragments in their place; it is light, inexpensive, and easily applied. In fractures of the lower extremity, it permits the patient to remain up, and move about with the aid of crutches, during nearly the whole treatment, thus preventing injurious consequences. This bandage should never be applied until the subsidence of inflammation and swelling. Apply the bandage as follows: The whole limb is enveloped in a layer of cotton batting laid along the limb and over the jutting prominences, firmly and evenly; over this should be laid splints of felt or pasteboard, properly shaped to fit the limb, and extending beyond and securing the two joints above and below the fracture, and well soaked in thin starch before application. The pasteboard, felt, or other substance, should be soft and carefully applied. If but little strength is required, as on children, a few slips of brown paper well starched may be used instead of pasteboard. A bandage saturated with thick starch must now be firmly applied, and this, in time, covered by another dry roller. Extension and counter-extension must be kept up until the bandage is thoroughly dry, which seldom happens before thirty or forty hours. When the bandages have become dry, the patient may be allowed to move about upon crutches, care being taken that the injured limb does not touch the ground. If the bandage gives discomfort, or becomes loose by a shrinkage of the limb, it must be slit up along the outer side of the limb by means of Seutin's scissors, and re-applied with the aid of a roller as before. If the fracture be compound, a trap may be cut in the bandage opposite the seat of injury, through which the wound may be dressed. The plaster of Paris bandage is also much used at present.

After-Treatment.—The leading indications in the treatment are to procure reunion and to prevent deformity. The fracture having been reduced and the dressings properly applied, the patient should be carefully watched in order that he may be safely conducted through his long and wearisome confinement. His diet for the first few days should be light, nutritious, and

unirritating, and attention should be given to the alvine discharges, as lying in bed for any length of time is apt to produce torpor of the bowels, and consequent irritation of the system, which is often productive of febrile reaction. If fever supervene, it may be removed by a few doses of *Aconite*, which must be increased in frequency as the symptoms become more urgent. After subsidence of the fever, the patient will return to his accustomed diet. Impose upon him moderation for a few days. If there should be retention of urine, it may be overcome by a few doses of *Cantharides*; but, if the bladder is not relieved by this agent, the catheter should be employed from time to time until the bladder returns to its accustomed functions. During this time the patient should be seen by the surgeon once or twice a day, and even oftener if the circumstances of the case demand it. During the urinary trouble the patient should drink sparingly of water, to check, so to speak, the hyper-secretion of the kidneys. The great danger, says Gross, "in nearly all cases," is during the first week; that past, there is seldom any risk. As soon as all inflammatory action has subsided, *Symphytum officinale* is capable of accomplishing the most beneficial results in assisting the reparative process, and the proliferation of cells, and the rapid formation of the constructive callus. In a number of fractures, treated both in civil and hospital practice, I have seen the most wonderful effects follow the use of this remedy; and so great is my confidence in its curative action in uniting fragments of bone, that I should feel that I was neglecting the best interests of my patient by withholding the use of this remedy. In every case in which I have employed this agent, union has been effected promptly, all the outward conditions in each instance being materially benefited as soon as the system became influenced by the medicine.

If the patient be of a scrofulous constitution, *Iodine* or *Calcareo* may be given as a constitutional remedy, say a single dose of the higher potencies at night, while the *Symphytum* is administered during the day as often as may be demanded by circumstances. If the periosteum has been injured during the violence which caused the fracture, *Ruta* and *Mezereum* are remedies of value, and may be given internally, or applied locally, as demanded. Threatened gangrene may be promptly cured by *Lachesis*, if the injured part assumes a dark violet-red color; and *China* or *Arsenicum*, if it has become blackened in appear-

ance. Other remedies may be required, according to the various diseased conditions that may arise, which must be met and combatted by the appropriate simillimum.

If there is much pain and swelling in the limb, it may become necessary to remove the dressings, and apply them more loosely; but this should be prevented if possible, as, by too frequent changing of the dressings, the ends of the injured bones are liable to become misplaced, and the reparative process impeded. The injured limb should be well protected from the weight and irritation of the bed-coverings, by the use of a tripod placed over the limb to sustain the weight of the bedclothes. As a precautionary measure, the fingers or toes of the fractured limb should be exposed, that the surgeon may be enabled to judge of its condition. If they appear unduly congested and swollen, the dressings should be removed at once, and re-applied with great care, to prevent supervention of gangrene. Once in two or three days, if everything goes on favorably, is often enough to renew the dressings for the first week or two; and after that time once or twice a week. While in no class of cases is meddlesome surgery to be more reprobated than in fractures, yet patients suffering from these infirmities require constant and careful watching by the surgical attendant, his visits being at least once a day until after the subsidence of all inflammatory symptoms.

As a means of preventing weakness and stiffness of the limb, use passive motion as soon as the fragments have become sufficiently united to preclude the possibility of interrupting the consolidating process; which will be about the third or fourth week after the accident. During its performance the limb should always be well supported by assistants, and motion made with moderation and gentleness, increasing gradually from day to day.

II. — Compound Fractures.

Definition.—A compound fracture is that form of injury which is complicated with a wound of the soft parts leading down to the bone at the seat of fracture. It may be caused (1) by the same injury that produced the fracture; (2) from a fragment of the broken bone being thrust through the skin; (3) by subsequent ulceration or sloughing of the integuments.

Dangers.—The danger from compound fractures depends, to a certain extent, on the amount of injury sustained. This

at times may be so great as to lead to the immediate supervention of gangrene, to the loss of life by hemorrhage, or to disorganization of the limb from reactionary inflammation. The more remote dangers arise from abscess, or the exfoliation of the bone, or by the secondary diseases that may arise, such as erysipelas, pyæmia, hectic, phlebitis, or congestion of the lungs, any of which may lead to loss of limb or life. In all serious cases of compound fracture, the first question to be decided by the surgeon is whether the limb should be removed or an attempt made to save it. If the bone has been much shattered, the soft parts bruised, and the cellular tissue torn up, and infiltrated with blood; if any of the large joints be implicated, with extensive injury of the soft parts; if one or more of the larger vessels of the limb have been extensively injured; if the patient be old or enfeebled, or if the collapse be excessive, — then amputation should be immediately performed, as being the only means by which the patient's life may be saved. If, however, the fracture be unattended by any of the complications just mentioned, and the patient be young and healthy, we shall generally succeed in saving the limb.

Treatment. — Having determined to save the limb, the first step to be accomplished is the reduction of the fracture, which is to be conducted on the same principle as in simple fracture. Any loose fragments of bone should be removed, and the wound closed, and dressed with lint saturated with *Calendula* or *Hypericum* lotion, with the hope of obtaining union by adhesion. If hemorrhage takes place from any small vessels in the neighborhood, that have been injured by the violence committed, compresses wetted with the tincture of *Gossypium herb.* will be found beneficial, not only in suppressing hemorrhage, but in healing the cut or lacerated ends of the injured vessels. I have found this remedy to act promptly in controlling hemorrhage from all lacerated or incised wounds, and in one case to stanch the current of blood from laceration of the superficial palmar arch, without resorting to any other expedient. The limb should then be placed in well-padded splints, protected in the vicinity of the wound by oiled silk, to prevent soiling of the clothes by the discharges. If there be much bruising of the soft parts about the wound, it will be best from the first to apply *Arnica* or *Hypericum* water dressings, to moderate the inflammatory action, and allow a vent for the discharges, which will

certainly ensue. The patient should be kept as quiet as possible. After suppuration has set in, *Silicea* should be given internally, light poultices wet with *Calendula* or a lotion of the same, applied to the wound, and the burrowing of matter prevented by the application of compresses, or by the use of counter-openings when necessary, and by attention to the position of the limb. The parts should be kept clean, and the dressings changed as often as they become soiled. Should the patient seem disposed to sink under the influence of close confinement and the exhausting discharges, the most nutritious food and drink should be freely administered, and the proper remedies administered to meet the exigencies of the case. As soon as the bone has become somewhat united, the limb should be put into a starch or plaster bandage, to enable the patient to keep up his general health by a change of air and position. The time required for the consolidation of compound fractures will be much longer than that of simple fracture, and will vary according to the amount of injury done to the soft parts, and the constitution of the patient.

If the compound fracture is accompanied with laceration of a large artery, the bleeding vessel must be tied in the wound, or the hemorrhage be controlled by position or pressure, if it does not yield to the remedies above mentioned. *Great comminution of bones, and fractures into large joints*, especially in the lower extremity, will sometimes demand immediate amputation. As strongly as I would advocate conservatism in surgery, I cannot but feel that immediate amputation will promote the best interests of the patient in most cases of compound fracture of the knee-joint. A compound fracture with a simple fracture in the cardiac side of the same limb, the soft parts lying between these fractures being more or less injured, demands amputation above the seat of the simple fracture. In fracture with dislocation higher up, after temporary reduction of the fracture the dislocation should first be reduced, the fracture being subsequently treated on its own merits.

SECTION III.

Non-Union and False Joint.

Non-union and false joint may arise in many ways:—sometimes from causes inherent in the part or system, as in the neck

of the thigh bone, olecranon and patella, which are not invested with synovial membrane; sometimes on account of want of attention on the part of the surgeon, or by some misconduct on the part of the patient himself. One of the most common causes of this accident is motion or movement of the fragments before they have become ossified. In such cases, the effused lymph will be converted into fibrous bands, which will unite the broken fragments, or the ends of the bones will become covered by synovial membrane, and union thus be prevented. Non-apposition of the bones is another fruitful source of this malady. Deprivation of nervous influence, debility from any cause, pregnancy, lactation, the inordinate use of spirituous liquors, a syphilitic, gouty, or rheumatic state of the system, may all exert their influence in retarding the reparative process.

Treatment.—The first indication is to find the cause of the imperfect union, and to combat it with appropriate measures. Debility must be counteracted by nutritive food and stimulants. A gouty, rheumatic, or syphilitic state of the constitution must be overcome by proper remedies. If it depends on too much motion of the fragments, the ends of the bones should be brought into perfect apposition, and confined by the use of the starch bandage or plaster of Paris mold. Should this fail, means must be taken to excite adhesive inflammation at the seat of the fracture. This may be done by rubbing the ends of the bones roughly against each other, by the introduction of a seton between the broken fragments, by scarifying the ends of the bone by means of a knife introduced subcutaneously, or by Bigelow's *subperiosteal resection* of the ends of the bone, holding them in apposition with a wire suture.

Dr. Brainard, of Chicago, suggests that the fragments of bone be drilled subcutaneously with a metallic perforator in the following manner: "In case of an oblique fracture, or one with overlapping, the skin is perforated with the instrument at such a point as to enable it to be carried through the ends of the fragments, to wound their surfaces and to transfix whatever tissue may be placed between them. After having transfixed them in one direction, it is withdrawn from the bone, but not from the skin, its direction changed, and another perforation is made; and this operation is to be repeated as often as may be desired." Professor Gaillard's method consists of

pinning together the fragments by means of a gimlet-like instrument, provided with a movable silver sheath, a handle and a brass nut; the sheath is introduced through an incision, and held against the bone while the shaft is passed through and made to transfix both fragments; the nut is then screwed down firmly on the sheath, the whole instrument being allowed to remain *in situ* till union is obtained. Whichever method is adopted, the after-treatment must be carefully conducted; *Symphytum* is to be administered externally and internally, and the case treated according to circumstances. I have never heard of, and certainly have never experienced in the various cases of fracture I have treated, both in hospital and civil practice, this mal-condition where the *Symphytum* was properly administered; and I do believe that non-union of bones, except under the most adverse circumstances, will never occur under the judicious use of this remedy. Professor Morgan, of Philadelphia, reports a number of cases of delayed union in bones to have been speedily corrected by *Calcareo phos.* from the third to the sixth potency. Dr. Helmuth also advises the use of *Calcareo*.

As a last resort, excision of the ends of the bone may be performed. This operation is not without danger, and should never be performed until after the failure of the more simple means. There are cases in which all these means will fail of accomplishing the desired object, and the limb remain useless. The only resource in such cases is the use of Professor Smith's apparatus, or some other suitable contrivance.

SECTION IV.

Fractures of the Bones of the Face.

I.—Fractures of the Nasal Bones.

Fractures of one or both of the nasal bones occur as a result of direct external violence, and are usually attended by injury and swelling of the soft tissues. The accident is complicated occasionally with fracture of the ascending process of the superior maxilla, and more rarely with displacement of the nasal cartilages, or fracture of the ethmoid, vomer, or turbinated bone.

Symptoms.—The deformity is a very marked feature, and, together with the ecchymosis and swelling, and the presence of

crepitation, generally renders the nature of the case apparent. Owing to the rapidity with which swelling ensues, the diagnosis is sometimes very obscure; hence in no case should the surgeon be satisfied with a hasty examination, as the slightest deviation from a perfect adjustment is followed by a very noticeable and unpleasant deformity.

The situation of the fragments is to be ascertained by passing the finger over the surface of the nose, while at the same time the irregularity and mobility of the parts may be more clearly shown by introducing a probe into the nostril, with which to make counter-pressure.

Treatment.—The first indication is to replace the fragments. To accomplish this, the patient should be seated upon a chair, with his head thrown backward, and resting against the breast of the surgeon or of an assistant, the operator to stand in front of the patient. A pair of ordinary dressing-forceps, a female catheter, or, if there be much swelling, a small, stiff probe or director, may be employed in elevating the depressed portions of bone, by passing it into the upper part of the nostril and pressing outward, at the same time facilitating the restoration by external manipulation with the fingers of the other hand. If the septum be broken, it may be restored to position in the same way, the shape of the nose being preserved by plugging the nares if necessary. In most cases no retentive apparatus is required. If it be desirable to apply medicated dressings, or to make pressure upon a prominent fragment, a double-T bandage, as represented in Fig. 130, may be applied. The introduction into the nostril of a metallic or gutta-percha tube has been recommended as a suitable means of preventing an inward redisplacement of the bones, while the older surgeons advised the use of pledgets of lint. Hemorrhage may be restrained by the use of *Gossypium* or *Erigeron* lotions, *Bisulphate of Iron*, ice water, etc., or, if obstinate, by plugging of the nostrils.

Fig. 130.



II. — Fracture of the Lachrymal Bones.

Fracture of the lachrymal bones may be produced by violence, and is liable to cause obstruction of the nasal duct, and consequent epiphora; or emphysema of the subcutaneous tissue may succeed each effort of blowing the nose.

Treatment.—The treatment consists in the restoration of the parts by manipulation, and the use of medicated dressings of *Arnica* or *Hypericum*, and their retention by appropriate bandages.

III. — Fracture of the Zygoma.

This may take place as the result of an injury; and, if simple, little else is required than cold medicated lotions to restrain swelling and pain, which should be kept in place by retentive dressings. If the bone is comminuted, the impaction of the splinters in the temporal muscles may interfere with mastication: in such a case, the surgeon will be justified in cutting down upon the parts, and removing the offending fragments. The wound thus made will be dressed as an incised wound.

IV. — Fracture of the Superior Maxillary Bone.

This injury is caused by great mechanical violence. The bone may be broken through its body, the nasal or the alveolar processes, or the horizontal plate may be the seat of fracture. The soft parts are injured to a greater or less extent, while the accident is liable to be seriously complicated with fractures of neighboring bones. The diagnosis is generally rendered easy by simple inspection or by manipulation. The inflammatory action is apt to run high, though commonly a favorable prognosis can be given.

Treatment.—Restore the parts to their normal position; and this, with the subsequent application of a retentive apparatus, is all that will be required. Efforts should be made to save all the tissues without removing any portion, however much injured. If the teeth have been knocked backward, they should be pressed into position and retained, if necessary, by tying the teeth with silver wire in the shape of a figure-of-8 suture. It may not be advisable to use the jaw in masticating solid food for months. If the fracture is *compound*, any loose splinters should be carefully

removed, and coaptation of the divided surfaces effected by means of adhesive strips, followed with a lotion of *Hypericum* or *Calendula*, retained by suitable dressings. If hemorrhage succeed, a free use of *Gossypium* lotion will usually restrain it.

V.—Fracture of the Malar Bone.

Fracture of the malar bone is an exceedingly rare accident, so much so that its existence has been denied by good authorities. It may result from direct violence, and is necessarily attended by severe contusion, thus having a tendency to excite inflammatory action.

Treatment.—Efforts should immediately be made to restore the displaced part to its natural situation, which will be best accomplished, if at all, by inserting a lever under the depressed portion of bone. The cure will be completed by the use of *Arnica* or *Hypericum* lotions.

VI.—Fracture of the Inferior Maxilla.

Fractures of the lower jaw may occur in any portion of the bone. The most common site is near the symphysis, between the lateral incisors, or between these and the canine teeth. The ascending ramus is also frequently broken; while the condyle, neck, and coronoid process are very seldom affected. Fracture through the symphysis, when occurring, is met with in young subjects, before the opposite portions of the bone are completely ossified. As regards the varieties of the fracture, it may be *transverse*, *oblique*, or *longitudinal*; simple, multiple, or complicated.

The *cause* of the fracture is commonly direct violence, by a blow, fall, or kick. Portions of the alveolar process are also frequently broken off by dentists in extracting teeth, while a few cases are recorded in which muscular action has been the means of producing fracture of this bone.

Symptoms.—The symptoms are displacement, mobility, and crepitus, which are quite perceptible, the *deformity* being observed by opening the mouth, when the level of the jaw will be found to be destroyed, and the normal relations of the teeth disturbed. The principal muscles to distort the fragments, are the masseter and the temporalis; while the digastric, the genio-hyoid, the mylo-hyoid, and the stylo-hyoid act as direct depressors of the

bone; hence, the fragments occasioned by fracture at any point anterior to the angle of the jaw, are readily drawn from their natural position by the antagonistic action of the elevator and depressor muscles. If the jaw is broken on both sides, the deformity will be very considerable, the central fragment being drawn downward, thus destroying the natural curve of the teeth, and producing a corresponding distortion of the mouth, which will be open to a greater or less extent.

Mobility of the fragments can be detected by fixing the anterior portion of the jaw, and making pressure upon the posterior fragment, when crepitation will be produced.

In fracture of the ramus of the jaw, crepitus affords the principal sign of the accident, as the mobility and displacement are hardly noticeable, in consequence of the extensive attachment of the masseter muscle, which extends over a portion of both fragments.

There will be more or less severe pain at the seat of injury, which is more constant than in most other fractures. There is, also, loss of function, rendering the patient unable to speak, swallow, or masticate with facility, while considerable contusion, with hemorrhage, is likely to co-exist.

Treatment.—In reduction, the patient should be seated upon a chair, his head being firmly supported upon the breast of an assistant. The surgeon then molds the part into proper shape, and closes the mouth so that the lower teeth rest firmly against the upper. If any of the sound teeth are loosened, or partially drawn from their sockets, they should be retained, and secured if need be to the adjacent ones, by a strong ligature or silver wire. After reducing the fracture, apply a piece of paste-board or gutta-percha, softened in boiling water, so that it shall fit the jaw accurately, and cover over all with either Gibson's or Barton's bandage of the jaw, as shown in Figs. 131 and 132. If any of the teeth are broken, and the adaptation imperfect, a thin, wedge-shaped piece of cork should be inserted between the molar teeth of each side, to keep the incisor teeth a little apart. If by chance a tooth shall have been broken, and fall into the sulcus between the broken parts, it should be taken out before attempts are made to coaptate the broken fragments. The interdental splints of gutta-percha, invented by Dr. Gunning, of New York, and their recent improvement by Surgeon Wales, U. S. N., fulfill

Fig. 131.



Fig. 132.



all indications necessary in the treatment of this fracture. The two dental splints are made of vulcanized rubber, so as to conform accurately to the shape of the teeth in both jaws. The plates should be made light and delicate.

In fracture of the neck or condyle of the jaw, it is much more difficult to maintain the broken bones in apposition, on account of the action of the external pterygoid muscle. The most effective method of counteracting this disposition, is to confine a thick, graduated compress behind the angle of the bone, the treatment being, in other respects, the same as in fracture of the body of the jaw, previously spoken of.

The parts should be covered with medicated lotions of *Arnica*, *Hypericum*, or *Calendula*, according to circumstances. See that displacement be not effected by the loosening of bandages, contraction of muscles, or the effort at mastication. The diet of the patient should consist of broth, gruel, grated crackers and milk for the first two or three weeks, after which a semi-solid farinaceous diet may be permitted.

Simple fractures usually recover in five or six weeks. Those of the neck require more time and more care in their management than those of the body and ramus. Complicated fractures, however, often terminate in serious consequences, such as abscess, caries, and necrosis, which must be treated upon the general principles already laid down under their respective headings.

SECTION V.

Fracture of the Vertebral Column.

This accident may result from the application of direct violence, as a fall or blow, and more rarely from "contre-coup," as, for example, when a person falls from a height, alighting upon his feet or hips. Whatever the cause of the injury, however, the fracture may occur through the body of the bone, or through the spinous, oblique, or transverse processes.

Symptoms.—The effects of the lesion are to be considered with reference to the different portions of the spine implicated. The severity of the symptoms, however, will necessarily vary, according to the violence of the cause and the amount of injury sustained by other organs.

If the fracture occurs above the fourth *cervical* vertebra, the phrenic nerve will be likely to suffer seriously, thus paralyzing the diaphragm, and interfering with respiration, so as to produce death more or less speedily. If the injury is inflicted at a lower point in the cervical region, there will be more or less complete paralysis of the upper extremities, impaired respiration, relaxation of the anal sphincters and those of the bladder, together with distention of the abdomen.

If the accident be confined to the *dorsal* region, the upper extremities will suffer little or none, the principal symptoms being exhibited in the lower portions of the body, as the bowels and bladder.

When one of the *lumbar* vertebræ is broken, the nerves supplying the lower extremities become so much affected as generally to occasion paralysis, and perhaps loss of sensibility. The sphincter muscles of the anus are relaxed, the functions of the muscles of the bladder being also impaired.

The *diagnosis* of fracture of the vertebræ is so obscure as to leave the surgeon in the greatest doubt concerning the precise nature of the injury. Preternatural mobility, crepitation, and deformity may exist when the spinous processes are the parts affected; but, owing to the other portions of the bone being deep seated, the examination will ordinarily prove unsatisfactory.

The *prognosis* is generally unfavorable.

Treatment.—All efforts to restore the displaced fragments will almost invariably prove unavailing, and, if long protracted, will generally result in more harm than benefit.

Little can be done except to place the patient in a comfortable position, generally upon the side, meeting the inflammatory and other complications that may arise. The patient should not be allowed to lie with his face downward; as the pressure upon the abdominal viscera would interfere with the free descent of the diaphragm, which, together with the weakened condition of the patient, and the paralyzed state of the respiratory muscles, would tend immediately to produce asphyxia.

The bladder should be carefully watched, and the contents drawn off two or three times per day, which is by far preferable to leaving the catheter permanently in the bladder. *Arnica*, *Cicuta*, or *Hypericum* may be employed internally and externally; but, under ordinary circumstances, little is to be hoped for.

SECTION VI.

Fractures of the Ribs.

The fourth, fifth, sixth, and seventh ribs are the most frequently fractured, the upper ribs being protected by the clavicle, scapula, and the strong muscles covering them, while the shortness and mobility of the lower ones account for their immunity. The accident is confined chiefly to individuals of advanced age; children and young persons being seldom the subjects of this injury.

The *causes* producing fracture of the ribs are mechanical violence and muscular action; and they may act directly or indirectly.

The fracture is generally oblique, and may also be comminuted, multiple, and compound. Complications of a serious nature are liable to attend the accident; such, for example, as wound of the pleura, or of the lung itself, laceration of the neighboring muscles, together with injury of the intercostal artery and nerves. As a consequence of these various complications, pleurisy, pneumonia, congestion, or hemorrhage may supervene, and prove the principal source of danger.

Symptoms.—The characteristic symptoms of fracture, as crepitation, preternatural mobility, and displacement, are not so

readily detected in fracture of the ribs as in that of other long bones. The diagnosis is frequently somewhat obscure.

Crepitation may, in some instances, be elicited by pressing upon the seat of fracture, or by directing the patient to cough, or take a full inspiration, while the surgeon rests his hand over the point of injury.

Mobility may also occasionally be discovered during the progress of the examination, especially if more than one rib be broken.

The amount of *displacement* is commonly slight, unless several of the bones are injured; in which latter case the deformity alone may be quite sufficient to indicate the nature of the accident.

Emphysema is a sign of great value in determining the diagnosis, and is often accompanied by spitting of blood. Its existence is indicated by a puffy condition of the parts, which emit a peculiar crackling noise upon pressure.

Prognosis.—If the fracture is complicated with wound of the lung, the case is especially to be regarded as serious; and, indeed, the surgeon should, under all circumstances, be guarded in his prognosis, as high inflammatory action is particularly liable to supervene.

Treatment.—In the milder cases the chest should be encircled by a bandage, eight or ten inches in width, the same passing several times around the body, and drawn sufficiently firm to prevent the rising of the ribs, thus compelling the patient to breathe by the diaphragm. In preference to the above bandage, some surgeons substitute long strips of adhesive plaster, applied so that each succeeding turn partially overlaps the preceding one.

In addition to the bandage, a light compress should be placed upon the spine, while the fore-arm on the affected side should be brought across the chest at a right angle with the humerus, and confined in this situation, in order that the pectoral muscles may be kept entirely at rest. The patient is then to be placed in the position that affords the most comfort, either the sitting or slightly reclining posture.

If the fractured bone project outward, the above dressing is to be modified by placing a suitable compress over the seat of injury. If the fragments are driven inward, little can be done in the line of restoring the bone to its natural position

except to press upon the anterior or posterior part of the chest, with a view to spring the depressed extremity outward.

The emphysema will rarely demand especial treatment; as it commonly disappears spontaneously. Should it, however, be sufficient to interfere seriously with respiration, the air may be evacuated by the use of a delicate trocar.

Other complications are to be treated upon general principles.

The remedies of most value in the internal treatment of this affection are, *Aconite*, *Arsenicum*, *Belladonna*, *Carbo veg.*, *Digitalis*, *Lachesis*, and *Senega*.

Arsenicum.—When there is great dyspnœa, with threatened suffocation, great anxiety and restlessness, face livid and covered with cold perspiration.

Belladonna.—When the circulation is much disturbed, with dizziness, headache, palpitation of the heart, and fullness of the abdomen.

Carbo veg..—When dyspnœa is great, with paroxysmal cough, great anxiety, profuse expectoration; to follow *Arsenicum* when the remedy ceases to have a good effect.

Digitalis.—Complications with heart disease,—all the symptoms increased by talking, or drinking anything cold; worse when lying down.

Lachesis.—All covering around the neck and chest intolerable; worse after sleeping; is well adapted after *Arsenicum* and *Carbo veg.*

Senega.—Feeling of constriction in the throat and thorax, with disposition to take deep inspirations to increase capacity of the chest.

External Applications.—External applications of *Arnica*, *Hypericum*, or *Symphytum*, are to be applied to meet the corresponding symptoms.

SECTION VII.

Fracture of the Clavicle.

Causes.—The most common cause of the accident is counter-stroke, as a fall or blow upon the shoulder; in which case, the sternum offering a firm resistance, the force acts upon the shaft of the clavicle with sufficient violence to cause it to give way.

Occasionally it is broken by violence directly applied, as from a blow or fall, or the kick of an overloaded gun.

Muscular contraction has also been known to produce this injury.

Symptoms.—The symptoms are generally so well marked as clearly to indicate the true nature of the injury. The shoulder is drawn downward and inward by the weight of the arm and the action of the muscles, while the patient will be found strongly inclining to the injured side, and supporting the elbow of the same side with the opposite hand, in order to take the weight of the limb from off the broken bone, thus, in a measure, relieving the pain. The mobility of the arm is materially impaired, it being impossible to effect rotation, or to raise the hand to the face, or, in short, to produce any motions which will cause the external fragment to press upon the cervical nerves. Deformity is readily detected by touch, and often by sight; while crepitation can be elicited by grasping the elbow, and causing the head of the humerus to move in a direction contrary to the displacement, or perhaps, by simply pressing upon the more prominent fragment. More or less pain is experienced at the seat of fracture, as well as in the axilla; while a tingling or numbness, and perhaps paralysis, of the fingers and arm may result.

Prognosis.—Hamilton expresses it as his opinion, that, "in no other bone, except the femur, does a shortening so uniformly result." Gross writes that he is satisfied that a cure without deformity is a very uncommon result.

The greatest amount of displacement occurs through the middle third of the bone, and varies in extent from one-quarter of an inch to an inch; but osseous union is still likely to occur. If the union is altogether ligamentous, the chances are favorable to the subsequent usefulness of the arm.

A cure results in the course of five or six weeks in the adult; while in children the length of time required rarely exceeds twenty days.

Treatment.—The requisites are to carry the arm upward, outward, and backward, which, with manipulation along the broken surface, rarely fails to effect approximation of the ends of the fragments. This can best be done by the apparatus of Fox, which consists of a collar four inches wide, and long enough to go around the shoulder, sewed together on its sides, stuffed with

cotton, and joined at its ends. The pad is wedge-shaped, to which are attached two tapes to fasten it to the collar. The elbow-piece, or sling, is not unlike half of the sleeve of a coat, open above, and long enough to embrace the elbow, and mount half way up the arm. Two pieces of broad tape are attached to its upper and lower ends to elevate and hold the arm close to the side, as shown in Fig. 133.

Fig. 133.



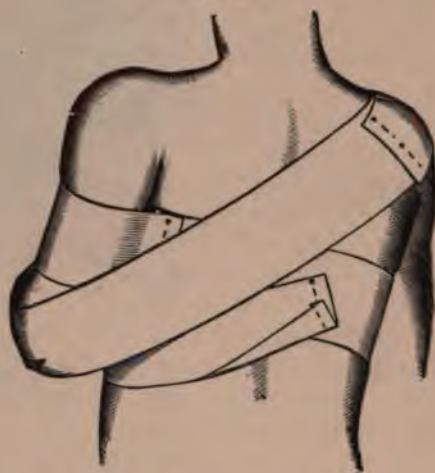
Dr. Dugas, of Georgia, treats fractured clavicle with a pad and a triangular piece of thick, unbleached muslin, to each angle of which is attached a bandage from three to four yards in length by three inches wide.

The plan of this dressing is to form a sling for the elbow and fore-arm, a pad for the axilla, and at the same time secure the arm firmly to the side.

Professor Sayre, of the Bellevue Hospital, has devised a simple and effective dressing for fractures of the clavicle, which consists of two strips of adhesive plaster three to four inches wide (narrower for children), one piece being long enough to surround the arm and go completely around the body, the other to reach from the sound shoulder around the elbow of the fractured side and back to the place of starting. The first piece is passed around the arm just below the axillary margin, and pinned and stitched in the form of a loop, sufficiently large to prevent strangulation, leaving a portion on the back of the arm uncased by the plaster. The arm is then drawn downward and *backward* until the clavicular portion of the pectoralis major is put sufficiently on the stretch to overcome the sterno-mastoid, and thus pull the inner portion of the clavicle down to its level. The plaster is then carried smoothly and completely around the body, and pinned to itself on the back to prevent slipping. This strip fulfills the two-fold purpose, first, of putting the clavicular portion of the pectoralis major on the stretch, and preventing the clavicle from riding upward; second, by acting as a *fulcrum* at the center of the arm, when the elbow is pressed downward, forward, and

inward, it necessarily forces the other extremity of the humerus (and with it the shoulder), *upward, outward, and backward*; and

Fig. 134.



it is kept in this position by the second strip, which is applied as follows: Commencing on the front of the shoulder of the sound

Fig. 135.



side, draw it smoothly and diagonally across the back to the elbow of the fractured side, where a slit is made in its middle to

receive the projecting olecranon. The elbow, being held by an assistant *well forward and inward*, is retained there; while the strip is continued over the elbow and fore-arm, pressing the latter close to the chest, and, securing the hand near the opposite nipple, crosses the shoulder at the place of beginning, where it is firmly secured by pins. By this process the fractured bones are retained in position, and they cannot be displaced by any reasonable amount of force. In the case of children, where it is so difficult to retain the ordinary dressings, this method possesses advantages superior to any known. I have used it in three cases, two of children and one in an adult, who had sustained fractures of this bone, and was gratified at the entirely successful results in each case. I feel confident, that, if once used, no other dressings will be substituted for this exceedingly simple and efficacious method of treating these fractures.

In fracture of both clavicles the difficulty in the treatment is much increased; but the same principle of adjusting apparatus heretofore given will be as appropriate in double as well as single fractures of this bone. The after-treatment will be as in other fractures, with the free use of *Symphytum* internally, and locally applied.

SECTION VIII.

Fractures of the Scapula.

I.—Fracture of the Acromion Process.

Fracture of the acromion may be produced by violence applied to the top of the shoulder, or directly to the process itself; while in rare cases it may result from a fall upon the elbow or palm of the hand, thus forcing the head of the humerus violently upward.

The *symptoms* are so clearly defined as to render the diagnosis easy. The shoulder has a flattened appearance, the outer fragment being drawn downward by the weight of the arm. Pain, more or less intense, is referable to the seat of injury; the patient leans toward the affected side; while crepitation can be detected by forcing the head of the humerus upward, against the depressed ment; and an evident inequality is felt in tracing the spine of scapula.

Ligamentous, instead of osseous, union generally results in consequence of the difficulty experienced in keeping the fragments in perfect apposition.

Treatment.—The leading indications are, first, to secure the arm and fore-arm firmly to the antero-lateral part of the chest; secondly, to raise the humerus firmly against the top of the shoulder-joint, in order that its head may serve as a splint for the broken process. For this purpose, the same bandages, etc., are to be applied as for fracture of the clavicle, except there shall be *no pad in the axilla*, lest the broken fragment be pushed too far outward. Union is almost always ligamentous, in consequence of the difficulty of keeping the parts in complete apposition. Velpeau's bandage answers a good purpose in this accident. In

Fig. 136.



applying this bandage, the hand of the injured side is made to grasp the sound shoulder, a compress or piece of muslin intervening between the side of the chest and injured arm, to prevent excoriation from contact and perspiration. Then place the initial end of a roller ten yards long and two and a half inches wide, under the axilla of the sound side, over the back and injured shoulder, down the front and outside of the arm, under the outside of the elbow up and over the chest, to the sound axilla, as is shown in Fig. 136. Passive motion should be begun in about three weeks, or as soon thereafter as can be safely instituted.

II.—Fracture of the Coracoid Process.

This is an accident of such extremely rare occurrence that its existence has been called in question by some very worthy authorities.

III.—Fracture of the Neck of the Scapula.

This rare accident, in which the glenoid cavity and the coracoid process are detached from the body of the bone, gives rise to a train of symptoms, as follows: There is flattening of the deltoid, the acromion is unnaturally prominent, and the head

of the humerus can be distinctly felt in the axilla, giving the limb a somewhat lengthened appearance. The coracoid process occupies a position below the clavicle, between the deltoid and pectoral muscles. Crepitation is produced by placing the hand on the shoulder, and rotating the arm upon the scapula, while the deformity is readily removed by pressing the humerus directly upward; the displacement, however, immediately occurs so soon as the arm is allowed to hang by the side.

Diagnosis.—This accident is distinguished from dislocation of the head of the humerus into the axilla, by the fact, that, in fracture, the parts can be easily restored to their normal position, but assume their abnormal relations as soon as external support is removed. In fracture, also, crepitation is more or less easily detected, but is always absent in dislocation. In fracture, the shoulder can be moved freely; in dislocation, there is immobility. It is, moreover, liable to be confounded with fracture of the neck of the humerus: the distinction is to be made by observing, that, in the latter injury, there is shortening instead of lengthening of the arm, while the shoulder also retains its natural appearance.

Treatment.—The shoulder must be supported by the same sling, bandage, and pad, that are used for fracture of the clavicle. It is managed in the same manner as this fracture, by keeping the elbow well raised, a pad being placed in the axilla, and the scapula thoroughly steadied until reunion has been effected. It is exceedingly difficult to retain these broken fragments in apposition; and stiffness of the joint is liable to follow, with atrophy, and paralysis of the arm, and other disagreeable symptoms. Passive motion should be instituted at the end of three weeks, and cautiously kept up. Consolidation may be expected in two months.

If the parts are much contused, *Arnicated* lotions should be continuously applied until the soreness has passed away; after this, a lotion of *Symphytum* should be applied to the part, by means of a compress, saturated with the remedy. It should be administered internally; as its action will have a salutary influence in assisting, or rather stimulating, bony reunion.

IV.—Fracture of the Body of the Scapula.

Fracture of the body of the scapula rarely occurs. The *symptoms* are liable to be greatly obscured by the rapid super-

vention of swelling; while it is also to be observed, that, owing to the peculiarity of the muscular attachments of the bone, the fracture is rarely accompanied by displacement of the fragments, especially if traversing the body, below or above the spine, or through either of the angles. The principal reliance is to be placed upon digital examinations in this case, at the same time causing the scapula to occupy different positions, by varying the movements of the arm. Thus, the superior angle is rendered prominent by carrying the hand of the affected side over the sound shoulder; while the inferior angle is made to project by placing the fore-arm across the back, having the elbow well elevated. Efforts should be made to detect crepitation, by grasping one portion of the scapula, while the arm is moved freely in various directions.

Treatment.—The leading indication in the treatment of this accident, is to steady the shoulder-blade, by the use of two large, narrow, and moderately thick compresses, placed along its axillary and vertebral borders, and confined by a broad roller, carried around the upper part of the trunk; or, instead of this, they may be secured by means of large adhesive strips. The arm and fore-arm are then fastened to the anterior part of the chest, as in fracture of the clavicle.

Inflammation of the part must be combatted by the usual remedies; and, if fever be present, *Aconite* is indispensable.

After inflammation of the part has subsided, *Symphytum* may be profitably given, two or three times a day, in the higher attenuations, as recommended in a previous article.

SECTION IX.

Fractures of the Humerus.

Fractures of the humerus may with propriety be divided into those of the upper articular extremity, the shaft, and the condyles.

The fractures of the upper extremity are those occurring *within*, and those occurring *without*, the capsule.

Intra-capsular fractures, or those within the capsule, are the simple fracture of the anatomical neck, and *impacted* fracture of this portion of the bone.

Extra-capsular fractures, or those without the capsule, are fractures of the surgical neck, simple and impacted, and separation of the great tubercle from the head of the bone.

When fracture takes place within the capsule, the diagnosis is very difficult: the impairment of the motions of the joint, crepitus, loss of motion of the shoulder, swelling, pain, more or less deformity about the shoulder, and an irregularity produced by the upper end of the lower fragment, with more or less shortening of the arm, are almost the only symptoms indicative of this injury. Bony union cannot well occur, and the detached head of the humerus is apt to become carious or necrosed, requiring an operation for its removal.

In *impacted* fracture, the upper fragment penetrates the lower one, producing a twisted appearance of the arm, and the axis of the humerus is directed slightly inward, toward the axilla. The head of the bone can be felt in the glenoid cavity, but it is not in the axis of the limb; the elbow projects slightly from the side, and a hollow is felt under the acromion. Crepitus can only be detected by firmly grasping the shoulder and rotating the elbow.

In *extra-capsular* fractures, or those without the capsule, the bone is broken through the surgical neck, and strictly involves that portion of the bone uncovered by the capsular ligament, or that portion of it which is below the tubercles, but above the insertion of the pectoralis major and latissimus dorsi muscles. This accident may occur in children as well as in adults; in the former the separation taking place through the line of junction between the epiphysis and the shaft of the bone. In this fracture, the displacement is double, the head of the bone and upper fragment being rotated outward, and drawn thither by the action of the muscles inserted into the great tuberosity, while the shaft is drawn upward and inward, under the coronoid process, by the muscles passing from the trunk to the arm, and by the flexors of the limb.

These fractures, except the intra-capsular, usually unite by bone. The circulation is probably kept up through the untorn ligamentous bands surrounding and attached to the neck of the bone. In *impacted* fracture, bony union readily takes place. In these fractures, the patient should be informed that some deformity, with more or less loss of motion, will most probably ensue.

In aged persons, the head of the bone is sometimes not only broken off, but thrown down into the axilla, where it forms a distinct tumor, which may readily be felt by the fingers, but which does not obey the motions of the arm. The absence of a

rounded tumor in the axilla, and the impossibility of feeling the glenoid cavity, are the distinguishing features of luxation.

Treatment.—The management of these fractures is to be conducted on the same general principles as that of those occupying the surgical neck of the bone, to which the student is referred for the necessary details.

L.—Fracture of the Surgical Neck.

Symptoms.—The *deformity* is usually considerable and characteristic. First, there is a marked angular displacement, resulting from the combined action of the pectoralis major, latissimus dorsi, and teres major muscles, upon the inferior fragment, drawing it toward the axilla; while the superior fragment is slightly elevated under the coraco-acromial ligament, by the muscles attached to the tuberosities of the bone, thus producing a distinct projection in front of the joint. The action of the deltoid and flexors also serves to draw the upper portion of the lower extremity

Fig. 137.



A FRONT VIEW OF THE RELATION OF THE PARTS CONCERNED IN A FRACTURE OF THE SURGICAL NECK OF THE HUMERUS.—1. Deltoid muscle. 2. Pectoralis major dissected off from its origin and turned over the humerus, so as to show its insertion. 3. Insertion of the latissimus dorsi muscle. 4. The subscapularis muscle. 5. The supra-spinatus, as seen behind the clavicle. (After Hines.)

of the humerus upward and inward, causing the elbow to project somewhat from the side. The condition of the parts is well represented in Fig. 137.

Second, the axis of the limb is more or less changed, being directed in front of the natural line.

Third, shortening, though not an invariable sign of this injury, is often apparent, being due to the contraction of the deltoid, biceps, and triceps muscles.

Crepitation can be detected by simply rotating the arm, or by elevating the bone and carrying it outward. In addition, the patient is found unable to exercise the functions of the arm and hand.

Treatment.—Overcome the action of those muscles which tend to produce the deformity, and, at the same time, give support to the parts when placed in their natural position. The dressings which have proved most useful in my hands have been four splints, and a pad similar in shape and size to that used for fracture of the clavicle. This will act, both as an inside splint, and as a support to the upper end of the lower fragment. Of the four splints, one should be angular, and reach to the middle of the humerus on the inner side, so as to keep the elbow at rest, while the three straight splints should be of sufficient length to reach from the upper part of the shoulder to the elbow, but not so long as to interfere with the flexion and extension of the forearm. They may be made of wood, pasteboard, gutta-percha, tin, wire, or any material, so that they be adapted as perfectly as possible to the limb. Cloths saturated with gum arabic, or plaster of Paris, molded to the limb, and permitted to harden, have been highly recommended. The splints should be light, of such a shape as to fit the convexity of the arm, and of sufficient strength to afford firm support to the broken parts. The limb should be bandaged from the fingers up to prevent œdema, and the splints "well padded," carefully applied, and secured in their places by spiral turns of the roller, extension and counter-extension being kept up by the aid of assistants. If the lower fragment of the broken bone is drawn inward, the pad is placed in the axilla with its thick end up. If the upper fragment is drawn inward, its position is reversed. If there is but little deviation of the fragments, the pad may be omitted, and its place filled by a well-padded splint. In all cases, the parts should be well washed

with soap and water before the splints are put on, and whenever they are removed; otherwise, the retained perspiration may cause an intolerable itching, and tempt the patient to loosen the bandages in order to scratch the parts. The arm is now secured to the side of the chest by a few circular turns of the roller. The wrist is supported in a sling, the elbow left free, that by its weight it may prevent overlapping of the fragments, and prevent shortening of the limb. Care should be taken to prevent false ankylosis of the elbow-joint, and passive motion should be instituted about the end of the third week. Firm union may be usually expected in about five weeks.

Erichsen uses a pad, a leather shoulder-cap, and a sling, while Hamilton employs a simple outside splint of gutta-percha without any pad. Welch's shoulder-splint has also been recommended in the treatment of these injuries.

After-Treatment.—The after-treatment must be conducted on the same general principles already given, deviations occurring only in case of any unpleasant symptoms that may arise, which will have to be treated accordingly.

II.—Fracture of the Shaft.

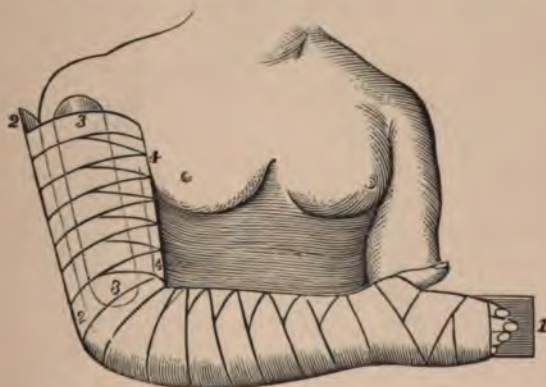
Fracture of the shaft of the humerus may result from direct or indirect violence. The injury is comparatively easy of diagnosis and treatment, and results in reparation without deformity or impairment of function. The fracture is usually oblique, unless occasioned by muscular action, when it is more likely to be transverse.

Symptoms.—Deformity, preternatural mobility, and crepitation, the three characteristic signs of fracture, are commonly well defined in this accident. The *deformity*, however, depends much upon the precise point and direction of the fracture; thus, if the separation of the bone occur immediately above the insertion of the deltoid, the lower fragment is liable to be drawn upward, and slightly outward, by the action of this muscle, while the superior fragment is carried somewhat inward by the pectoralis major. But, if the fracture occur below this point, which is more common, and is oblique, there is considerable displacement; the conjoined action of the biceps, brachialis anticus, in front, and the triceps, on the posterior aspect of the arm, serving to draw the lower fragment upward, over the superior fragment,

producing a shortening of the limb, varying in extent from a quarter of an inch to an inch and a half.

Treatment.—In treating fractures of the shaft of the humerus, four splints will be required. An angular splint, "which is to be applied to the front of the arm," of sufficient length to reach from the axilla to the ends of the fingers, and three splints of the length of the arm, which are to be applied respectively to the back part, the outside and inside of the arm. These should be of light material, and molded to fit that portion of the arm to which they are to be applied. These splints being well padded and ready for use, extension and counter-extension are made by assistants, and the arm carefully bandaged from the fingers to the axilla. This bandage performs the double office of preventing œdema, and controlling the action of the muscles. The splints are then placed in position (Fig. 138), and firmly secured in their places with the roller. The fore-arm is then carried across the chest, and supported by a sling. The angle of the long splint should be changed from time to time, in order to prevent stiffening of the elbow-joint, which is liable to ensue if the joint is confined too long in one position.

Fig. 138.



A VIEW OF THE DRESSING APPLIED TO A FRACTURE OF THE SHAFT OF THE HUMERUS.—1. The front angular splint. It should be represented with the palm of the hand turned up to the chin of the patient. 2 2. The splint on the back of the arm. 3 3. That on the outside. 4. That on the inside of the arm, the position of the arm across the chest making it appear to be placed toward its inner side, but this is the seat of the angular splint which keeps the elbow at rest. (After Nature.)

III. — Fracture of the Lower Third of the Humerus.

Fracture of the condyles of the humerus is an accident of common occurrence. It may result from a fall upon the point of the elbow, by a direct blow, or by the parts being crushed between two opposing surfaces. Not unfrequently, also, the injury has been produced in consequence of falls upon the palm of the hand, the limb being in an extended position.

The lower end of the humerus may be fractured transversely or obliquely above the condyles; or either condyle may be broken off; or, in children, the lower epiphysis may be separated from the shaft of the bone.

This variety of fracture may be comminuted, compound, or complicated with dislocation. It is on this account that it is difficult to ascertain the precise nature of the injury; but there will be no trouble to detect that a fracture has taken place. The

Fig. 139.



parts will be found hot, swollen, and discolored, and the pain excessive. More or less deformity is observed, with crepitation upon flexing and extending the arm.

When the *inner condyle* is detached, it forms a distinct tumor on the posterior aspect of the elbow, the ulna projects backward

when the fore-arm is extended, there is a slight increase of the width of the joint, and crepitation is perceptible upon motion.

Fracture of the *external condyle* presents a distinct tumor, by the abnormal situation of the condyle; crepitation is felt on rotation; and the hand takes the supine position, the elbow being somewhat flexed.

Treatment.—Relax the contraction of the triceps; keep the arm at rest; put the patient in bed with the arm reposing upon a pillow, till all inflammation has subsided. Apply the angular splint to the front of the arm, which by means of a hinge can be placed at any angle desired; after the broken fragments have been returned to their places by extension and counter-extension, bandage the arm as in fracture of the shaft; have the splint well padded, especially at the elbow, and all retained by the roller. Overcome inflammation by local and general means. Begin passive motion after the fifteenth day; and, in less severe injuries, about the tenth day.

Compound fractures of the condyles are very serious, and require the earnest care of the practitioner. The fore-arm should be simply laid upon a hair pillow, placed in a position that would be most useful for the patient in the event of ankylosis. Here the antiseptic treatment is valuable, or medicated lotions of *Hypericum*, *Calendula*, or *Ruta grav.*, according to the tissues injured and the state of the wound. If the joint is freely opened, *primary* or *secondary* excision will have to be performed; if the vessels are torn and the soft structures extensively lacerated, amputation should be done if it be found impossible to save the limb. *Symphytum*, to stimulate bony union, after inflammation is checked, should be used.

SECTION X.

Fractures of the Fore-Arm.

I.—Fracture of the Olecranon.

The *olecranon*, when fractured, presents the following characteristics: A bony tumor on the back of the arm; its continuity with the ulna is broken; its relations to the condyles of the humerus are abnormal; crepitus can be detected by manipula-

tion; there is loss of power of extending the fore-arm; an empty space behind the elbow; and a history of traumatism.

Fig. 140.



Treatment.—Extend the arm by means of a straight splint on the anterior surface, long enough to reach from the middle of the arm to the center of the fore-arm, which should be well padded. If there is irksomeness of position, a slight degree of flexation may be permitted, the indication being in all cases to keep the fragments in apposition. To this end, Clark's (Fig. 140), Dessault's, Hamilton's, Cooper's, or Boyer's dressings should be applied. (See Franklin's Surgery, Part II., page 428.)

II.—Fracture of the Middle of the Fore-Arm.

Both bones may be broken, or only one. When both are fractured, the deformity, crepitus, and preternatural mobility will make the diagnosis clear: if one bone is broken, it is not so easy to determine the exact nature of the injury. These fractures are either simple or compound, and as a rule give good results.

Treatment.—In simple fracture of the fore-arm, but two splints are required, one for the front and one for the back of the arm. These splints should be a little wider than the limb, and long enough to reach from the condyles to the extremities of the fingers, and be well padded along the center line, corresponding with the interosseous space, to prevent the bones from impinging upon that space. (Fig. 141.)

The fracture having been reduced by extension and counter-extension, the fore-arm is placed in a position midway between pronation and supination, the thumb pointing directly upward,

and the splints well padded, applied, and secured in their place by the use of the roller. The arm is then to be supported by a sling. The dressings should be changed from time to time, and every precaution taken to prevent chafing of the skin. No bandage should be employed underneath the splints, and the

Fig. 141.



A view of the splints, etc., as applied in the treatment of a fracture of one or both bones of the fore-arm. (After Nature.)

dressing should be renewed every other day for a fortnight. A *perfect cure* of fracture of both of these bones is rarely attained; but this treatment produces as good results as any other, and is exceedingly simple and easy of application.

III.—Fracture of the Shaft of the Radius.

The radius may be broken without being complicated with fracture of the ulna; and this is the most common injury of this class to which the fore-arm is subject. Simultaneous fracture of both bones occurs next in frequency, while fracture of the ulna alone is a comparatively rare accident.

The seat of fracture of the radius is commonly in the lower half of the bone, the cause being generally due to a fall upon the palm of the hand, though it occasionally results from direct violence.

Symptoms.—The symptoms are ordinarily well marked, there being more or less angular deformity, with a tendency on the part of the lower fragments to approach the ulna; together with preternatural mobility, crepitation, and loss of function. There is no shortening of the limb, in consequence of the situa-

tion of the ulna. The *displacement* of the upper fragment is occasioned by the action of the biceps and pronator radii teres, the former drawing it upward, while the latter carries it inward, causing it, also, to occupy a position midway between pronation and supination.

The lower fragment suffers more or less displacement inward, owing to the contraction of the pronator quadratus, the latter muscle producing, at the same time, more or less pronation. The supinator longus has a tendency also to increase the distortion by elevating the inferior extremity of the bone, thus depressing still more the upper end of the fragment.

Treatment.—Fracture of the shaft of the radius in the middle portion of its extent, requires the same treatment as fracture of both bones of the fore-arm. The objects in the treatment are to prevent the fractured ends of the bone from being pressed inward toward the interosseous space, and to prevent the upper fragment from being more supinated or everted than the lower. To effect this, one splint should be applied to the anterior, and one to the posterior, plane of the fore-arm; this latter extending from the elbow to the extremities of the fingers, the hand being kept in a state midway between pronation and supination. To accomplish this, the lower ends of the splint should be shaped somewhat like the handle of a pistol; thus keeping the hand downward, and forcing outward the lower end of the radius, and in this manner counteracting the tendency of the pronator to draw it toward the ulna. The thumb should be kept looking directly upward.

IV.—Fractures of Inferior Extremity of Radius.

Fractures of the inferior extremity of the radius present a great diversity as regards situation, direction, and extent; they are, however, comprehended under two varieties, one of which implicates the radio-carpal articulation, the other being seated immediately over this joint. The former is known as *Barton's*, the latter as *Colles's* fracture, each receiving its name from the writer who first accurately described it.

Barton's Fracture.—Two distinct fractures occur at this extremity of the radius: one *transverse*, extending through the joint, and chipping off the posterior margin of the articular surface, extending diagonally upward and across the bone until

it terminates three-quarters of an inch above the joint; the *oblique* extending nearly in the same direction, but only splitting off the portion of the articulation immediately connected with the styloid process, both of which are included in this variety of fracture known as Barton's.

The *symptoms* of this accident are as follows: There is "pain in the wrist, and a fullness is observed on the front of the wrist, looking not unlike a swelling of the bursa, or of the tendons; while on the back of the hand there is but little deformity, more or less *lateral* displacement being always present, particularly if the styloid process of the ulna is broken.

"If, under these circumstances, the surgeon places a finger upon the head of the radius and pronates and supinates the *wrist*, the patient will not suffer greatly, and the head of the radius will be observed to rotate under his finger, because the attachments of the carpal, as well as of the interosseous, ligaments, prevent such a separation of the fragments as would enable the lower fragment to be moved independently of the wrist. But if he puts his finger upon the head of the radius, and then, *seizing the styloid process* of this bone and its carpal articular face with the finger of the other hand, rotates it gently, the head of the bone will be observed to remain stationary, while the fragment below will rotate, and create such violent pain that the diagnosis can at once be made."

In the diagnosis of this injury from luxation of the radius forward, it should be remembered that Barton's fracture is an accident of comparatively frequent occurrence, while luxation of the radius is rare.

If extension and counter-extension be employed, with firm dorsal pressure above the line of the carpus, the deformity in this fracture will disappear just as that of a luxation might be expected to do; but, as soon as these forces cease to act, the deformity will be reproduced in the fracture by the action of the extensors of the hand and fingers, which will not be the case in simple dislocations.

Besides this, the force sufficient to overcome the deformity in Barton's fracture is much less than that which would be necessary to overcome the deformity from simple dislocation.

Colles's Fracture.—There is another fracture of the lower part of the radius, which was first noticed by Colles, of Dublin, in the year 1814.

He described it as occurring at a point about *an inch and a half above the wrist-joint*, not involving the articulation, and therefore differing in this respect from that of Barton. *Colles's fracture*, as it is now designated by European writers, produces a deformity which approaches in character that of Barton, though not precisely similar. In both, there is lateral displacement, this being most marked in Barton's; but in Colles's fracture, the fullness on the front of the wrist is not so marked as in Barton's, while that upon the *back* of the hand is much more so.

Both these fractures somewhat resemble each other, and may be confounded: thus, both are fractures of the lower part of the radius; both create deformity about the wrist; both impair the motion of the joint: but the principal difference is to be found in the fact that one (Barton's) passes into the articulation, while the other (Colles's) does not; that the pronator quadratus muscle is involved in the injury described by Colles, but not in Barton's fracture.

All these injuries will, however, if not well reduced, materially impair the motions of flexion of the wrist, as well as pronation and supination of the hand. Barton's will also create marked lateral deformity. Barton's fracture predisposes to a subluxation of the hand, externally and laterally; Colles's, to one of the carpus anteriorly. Colles's creates the curve on the back of the hand, that Velpeau has described as that of the "silver fork," and both cause swelling of the anterior carpal bursa. When there is marked *lateral* deviation, the fracture will probably be Barton's, and must be remedied by counteracting the action of the thumb extensors.

Treatment.*—As the seats of Barton's and Colles's fractures "differ, and the deformity also varies, the treatment might at first appear to be necessarily different. Yet this is not so. In both injuries, perfect rest of the carpal articulation is necessary; in both, the equalization of the anterior and posterior surfaces of both the upper and lower fragments is essential to prevent deformity; and in both it is necessary to guard against inflammation of the carpal articulation, and a tendency to luxation."

Barton's Method.—This method requires two compresses, about three inches by two, or else two and a half square, graduated from one end, and two splints prepared as in fracture of

* See Franklin's "Science and Art of Surgery," p. 415.

both bones of the fore-arm, together with a two and a half inch roller. One of these compresses is then placed on the front of the wrist, with the thick end downward, a little above the articulating end of the radius; the other is to be placed on the back of the wrist, with its thick end upward, so that it may be on a line with the end of the other compress, so that one may begin where the other ends, though on opposite sides of the wrist. These are then fastened in their places by a few turns of the roller loosely applied. The two splints are then applied as in fracture of both bones of the fore-arm, and confined in position by the spiral bandage, as shown in Fig. 142. At the end of a few days the bandages may be tightened from time to time, and slight motion made at the joint, in order to prevent ankylosis. In four weeks and a half, in favorable cases, the splints may be left off; but the arm should be bandaged, and supported with a sling for a couple of weeks longer, when the patient may resume the use of the limb.

Fig 142.



A VIEW OF BARTON'S DRESSING FOR FRACTURE OF THE LOWER END OF THE RADIUS, AS DESCRIBED IN THE TEXT. — A. The graduated compress. 1 2. The thick end of each compress as applied to the wrist, and represented as seen through the splints and bandage, which retain them in position. (After Nature.)

Bond's Method. — From a light board of proper thickness for a splint, cut a profile of the fore-arm and hand of the patient, extending the profile from the elbow downward, as far as the second joint of the fingers when these are moderately flexed:

the lower end must then be cut off at an angle of fifteen or eighteen degrees. The board is then covered with sheeting. A block of soft wood, from an inch to an inch and a half in thickness, and from two to two and a half inches wide, and carved and rounded so as to adapt it to the form of the hand and make it easy for the thumb, is then fastened to the lower extremity of the splint, so that the remote edge of it shall correspond exactly with the lower oblique end of the board. A piece of pasteboard, of sufficient width to extend beyond the edges of the board about an inch, is now fastened to the whole length of the splint, save that portion which is covered by the palm block, thus forming a sort of box, in which the arm is to be

Fig. 143.



Bond's Splint.

placed. See Fig. 143. Two compresses will usually be required in this, as in Barton's treatment. The compresses having been adjusted, the limb should be placed in the splint, and the roller applied, commencing upon the lower fragment of the radius, and carrying it down over the wrist, metacarpus, and the first joints of the fingers, leaving the thumb free, then returning to the upper end of the splint, and attaching it in several places to the covering of the splint. If the compresses have been properly adjusted, it is not necessary, when using this splint, to apply the roller with anything like the tension usually employed. Should the fracture occur so high up that there is danger of diminishing the interosseous space between the bones of the fore-arm, it will be necessary to use a dorsal splint. This should be of such a width as to effectually prevent the bandage from pressing on the fragments in such a manner as to lessen the interosseous space; and it should be of sufficient length to reach from near the elbow to the hand, but not to extend upon the metacarpus. Should stiffness and difficulty of pronation and supination remain after treatment, passive motion should be employed daily, and the local circulation be stimulated by means of medicated lotions

of *Symphytum* or *Hypericum*, or by gentle exercise, the cold douche, etc., according to indications. From five to seven weeks are usually necessary for the treatment of these cases.

SECTION XI.

Fractures of the Hand and Fingers.

I.—Fractures of the Carpus.

Fracture of the carpal bones never occurs except as a result of direct violence, which is frequently of so severe a character as to produce complications necessitating immediate amputation.

Diagnosis.—The diagnosis of the accident is generally rendered easy by the presence of deformity, loss of function, and crepitation.

Treatment.—Reduction of the displaced fragments may be accomplished ordinarily by simple pressure and counter-pressure. They are retained in position by two splints, reaching from the middle of the fore-arm to the extremity of the fingers, the splint upon the front of the wrist being well padded opposite the palm of the hand. The fore-arm should then be placed in a sling.

In the more severe cases, in which there is a considerable degree of comminution and laceration of the soft structures, nothing is demanded in the line of retentive means, except that a broad, well-padded splint be placed upon the front of the fore-arm, and secured by light turns of a roller, combatting the resulting inflammation by appropriate medicated dressings. Provided the patient escape amputation in these cases, he will not be likely to recover without permanent ankylosis and comparative uselessness of the hand.

II.—Fractures of the Metacarpus.

The metacarpal bones may be broken by direct violence, or by counter-stroke, as, for example, in striking against a resisting body with the clenched hand. The accident is liable to occur in *any* of these bones, but is most frequently met with in the metacarpal bones of the thumb, and those of the ring and little finger.

Symptoms.—The symptoms are such as to render the nature of the injury apparent, there being more or less marked deformity

on the posterior surface of the hand, in consequence of the outward projection of the anterior fragment. Crepitation is elicited by pressing the extremities of the fragments together, while there is also considerable swelling, with pain.

Treatment. — Provided the fracture occurs in the metacarpal bone of the thumb, it may be dressed with three splints, two of which should extend from the wrist to the extremity of the thumb, while the third, placed on the outside of the bone, should be only the length of the thumb. They are to be retained by the ordinary spiral bandage.

If the fracture occurs in any of the other metacarpal bones, the deformity may be reduced by making extension upon the corresponding finger, at the same time pressing firmly upon the displaced fragments. A felt or thick pasteboard splint is now to be accurately molded to the palm or back of the hand, and held in position by a few turns of the roller, the fingers being slightly flexed. In case the metacarpal bone of the index or little finger is broken, care is to be taken to have the splints sufficiently wide to prevent the roller from pressing upon the sides of the hand. A ball of twine grasped within the hand, the fingers being bound over it by means of a roller, has been recommended for fractures of the metacarpal bones. For fracture of the lateral metacarpal bones, a flat wooden splint may be used as a support, cut to fit the hand and fingers.

Place the fore-arm in a sling, observing the necessary precaution of examining the parts frequently. Should the inflammatory action run high, it is to be combatted on the general principles already given. Passive motion is to be practiced as early as expedient, in order to prevent ankylosis.

In *compound fractures* involving these bones, every effort should be made to save the part; and, if removal becomes necessary, it should be done to as limited an extent as possible.

III. — Fractures of the Phalanges.

In consequence of the slight protection afforded by the muscles and tendons, fractures of the fingers are particularly liable to be attended by more or less serious complications. Owing to their extreme mobility, however, they are not so frequently the seat of fracture as is generally supposed.

The *symptoms* are so obvious as not to require enumeration.

Treatment.—Coaptation of the fragments having been effected by pressure and counter-pressure, retention is secured by means of splints, either of thin pieces of wood or binder's board, long enough to extend from the middle of the fore-arm to the ends of the fingers, the hollow of the palm being well padded, and the fore-arm supported in a sling. In the treatment of all fractures of the upper extremity, the limb (unless bound to the chest) should be supported in a sling, which may, within reasonable limits, be lengthened or shortened, according to the patient's fancy or preference.

SECTION XII.

Fractures of the Pelvis.

Fractures of the pelvis are often complicated with injury to the internal organs, which adds to their seriousness. They occur most frequently in the front or the back,—the rami of the pubes or ischium, or the sacro-iliac articulation, being the bones involved.

Symptoms.—The symptoms are pain, inability to stand or walk, preternatural mobility, and crepitus. Rupture of the bladder or urethra, with extravasation of urine, laceration of the rectum, or fracture through the acetabulum.

Treatment.—A broad bandage, or a padded belt, should be applied with moderate firmness round the hips, the knees tied together, and the patient kept perfectly quiet. A catheter should be passed, to ascertain the state of the bladder and urethra, and attention be given to the inflammatory conditions, as they arise, and the patient's circumstances demand.

SECTION XIII.

Fractures of the Femur.

Fractures of the femur may be considered under three divisions,—those of the upper extremity of the bone, those of the shaft, and those of the lower extremity. The treatment of these varieties should be conducted in accordance with the "General Considerations" of fractures, pp. 237-239. If the patient is able to bear the expense, a very good and convenient bed may be procured for

the treatment of the case; and the one to fill all the conditions required, and at a moderate price, is the one known as "Skinner's new and improved Fracture Bed." (Fig. 144.) It may be procured of the Messrs. Tiemann & Co., No. 107 East Twenty-Eighth Street, New York City. The dressings, splints, etc., recommended

Fig. 144.



under "Treatment" of Fractures (pp. 243 — 250), will be found advantageous to the practitioner in preparing the bed, and adapting the apparatus for the comfort and welfare of the patient.

Fractures of the upper extremity occur about the head and neck of the femur, and are often extremely difficult to diagnose with certainty. I shall follow the arrangement mapped out in my "Art of Surgery," and classify them as intra and extra capsular fractures,—which may be simple or compound.

I. — Intra-Capsular Fracture of Neck of Femur.

Intra-capsular fracture of the neck of the femur is peculiar to persons above fifty years of age; is more frequent in women than in men; and is produced by slight causes, as tripping on the pavement or floor, or stumbling over any object, a fall upon the great trochanter, stepping from a carriage, or turning awkwardly in bed.

Symptoms.—The symptoms are: shortening of the thigh; eversion of the foot; preternatural mobility; crepitus; change of position in the trochanter major; peculiarity of the patient's body in the erect position.

Shortening of the Thigh.—This seldom exceeds, at first, half an inch to an inch; but, from the subsequent yielding of the capsule of the joint, a greater separation is permitted between the

fragments, which may amount to two or two and a half inches. Sometimes it is very slight at the first, and only becomes decided after the lapse of a few days; and it may be gradual or sudden, according to the operation of the existing causes.

Eversion of the Foot.—Eversion of the foot is an almost invariable accompaniment of intra-capsular fracture, and is more marked in those cases in which the shortening is most considerable. This eversion has been attributed by some authors to the action of the rotatory muscles, and by others to the "natural attitude into which the limb falls when left to itself."

Preternatural Mobility.—This is an important diagnostic sign of intra-capsular fracture, except in those cases where impaction of the fractured ends of the bone has occurred, or the ends of the bones are held in apposition by interlocking of their roughened fragments, or from incompleteness of the solution of continuity. Its extent may be ascertained by rotating the limb upon its axis, flexing it upon the pelvis, carrying it behind the line of the sound limb, or inward and outward, which movements cannot be performed where there is dislocation of the head of the femur. The limb may be restored to its natural length by extension and counter-extension, but shortens again as soon as these forces have been taken off.

Crepitation.—Crepitation is one of the most important diagnostic accompaniments, is very rarely absent in intra-capsular fractures, and only so in those cases where impaction of the fragments occurs. It may be produced at will by rotation of the limb, with extension and counter-extension, the ends of the broken bone being rubbed one against the other.

Change of Position in the Trochanter Major.—This is a symptom of importance in this variety of fracture. The great trochanter is drawn upward toward the ilium, and consequently is much less easily seen and felt than in the natural condition of the parts, in which it is usually so conspicuous. It will be found to turn, as it were, upon a pivot, or to move in a segment of a circle of less diameter than natural.

Peculiarity of Position.—In the standing position, the heel of the fractured limb is directed toward the hollow between the ankle and tendo Achillis of the sound limb. When lying down, the foot drops outward almost horizontally, inclining nearly to a level, and in contact with the surface of the couch upon which the patient is lying.

II.—Extra-Capsular Fracture of Neck of Femur.

Extra-capsular fracture is situated at the base of the neck of the femur, and may be of two kinds, the *simple* and the *impacted*. In both cases the fracture is usually found to be at or just outside the insertion of the capsule of the joint. The trochanters are usually splintered, and sometimes entirely detached. The fracture may be further comminuted by the penetration of the superior piece into the inferior. This fracture is less frequently met with than the intra-capsular, and may take place at any period of life; but, according to Erichsen, is most frequent between the ages of thirty and forty, while Gross says that it is seldom met with in persons under fifty years of age, and is most frequent after the sixtieth year. It is usually caused by the application of direct violence to the hip; still, some cases occur from very slight causes, owing, no doubt, to the brittle condition of the bone, which is known to exist among the aged.

Symptoms.—The symptoms bear a marked resemblance to those which have been described as existing in intra-capsular fracture. The hip is much swollen, from extravasation of blood; crepitation is loud and distinct, and readily perceived upon rotating the limb, and in some cases the separate fragments may be felt. The limb is generally everted, and lies in any position in which it may be placed, the patient having lost all power to control its movements. Eversion is not always present; inversion occurring more frequently in this than in intra-capsular fracture. The shortening, which is always present, usually varies from half an inch to an inch and a half: unlike intra-capsular fracture, shortening is usually as great *immediately after the injury* as at any subsequent period. The pain is generally very severe, and increased by every attempt at motion. In addition to the above, there will usually be a high degree of fever, which often lasts a number of days.

Treatment.—The indications in the treatment of intra and extra capsular fracture are to overcome the deformity, restore the parts to their natural position and keep them at rest. The means generally employed to carry out these indications are the apparatus described on page 296, under the heading of "Hodgen's Method," and the common double inclined plane, or the apparatus known as Liston's Splint (Fig. 145), which is molded to fit the limb, and so constructed that by means of screws it may be

lengthened or shortened, to be adjusted nicely to the limb, and at the same time placed at any angle desired. The splint being well padded, the limb is placed upon it; the foot firmly secured

Fig. 145.



A side view of Liston's Improved Splint, as formed into a double inclined plane by the action of the screw beneath the knee.

to the foot-board. The leg being then bound to the splint by means of a single-headed roller, extension is made from the bend of the knee, counter-extension being kept up by the weight of the body. The whole limb is then secured to the splint. This splint, being lighter and neater, is preferable to the common double inclined plane made of wood.

Another mode, and one to which the author gives the preference in treating this fracture, is by means of the long straight splint known as Liston's splint. It consists of a long splint, reaching from the axilla to about six inches below the foot, a circular opening being made opposite the external malleolus. Two openings are made near the upper extremity, to receive the perineal bandage; and two notches cut in the lower extremity, to receive the roller used in making extension. The splint, being well padded, is now applied to the outer side of the limb; a smooth bandage is passed around the perinæum, and secured to the splint by passing the ends through the two open rings in its upper extremity. Extension is now made by passing a bandage or roller around the foot and through the notches in the lower extremity of the splint; counter-extension being kept up by means of the perineal band. The limb is now secured to the splint by means of the roller, thus bringing the parts into their natural position, and securing rest.

In these fractures about the head and neck of the bone, the author has of late years preferred Hodgen's splint as the best adapted to meet all the conditions of these cases; and believes that in its use as good results will be attained as by any other method. The extension plan of Dr. Davis is also highly recommended.*

III.—Fracture of the Great Trochanter.

Fracture of the great trochanter may occur independently of either of the preceding; it may occur at any period of life, and is always the result of great and direct violence.

The symptoms are, eversion of the foot, the patient lying in a helpless condition; great difficulty in obtaining crepitus; attended with contusion, discoloration, and severe pain.

Treatment.—The limb should be maintained in a state of perfect rest, which is best accomplished by means of two long splints applied to the limb, while the trochanter is drawn into its normal position by means of a broad, soft leather belt, extending around the pelvis. This is Mr. Cooper's favorite method of treatment. The method recommended for intra and extra capsular fracture is also highly spoken of by some practitioners.

Professor Gross's fracture-box is also highly praised.

IV.—Fracture of the Shaft of the Femur.

Fracture of the femur is of common occurrence, and may happen at any period of life, but is most frequently found among the middle-aged. It is usually produced by mechanical violence, such as a blow, or fall upon the part. It may sometimes, though very rarely, be the result of muscular action. They are generally oblique (except in children, when they are commonly transverse), and occur at the middle, upper, and lower third of the femur, their relative frequency being in the order named.

Symptoms.—The symptoms are usually well marked, and consist of shortening of the limb from two to four inches, with eversion of the foot. Crepitation is usually distinct. There is inability to move the limb. The amount of deformity varies in extent according to the seat of the injury. There is considerable swelling, and intense pain whenever any motion of the limb is

* See Franklin's Surgery, "Fractures of the Femur," p. 442.

attempted, with angular deformity, the lower fragment being drawn to the inner side of the upper one and rotated outward.

Prognosis. — In all fractures of this bone, be very careful how you promise patients a *perfect cure*; for experience teaches us that such a thing is rarely accomplished. Even in those cases which are treated with the greatest care, there will usually be found some shortening of the limb: this may be slight, from half to three-quarters of an inch being the general average. In persons under fifteen we may perhaps be more successful in obtaining a perfect cure. The duration of treatment usually varies from six to twelve weeks, according to the age of the patient.

Treatment. — In treating fractures of the shaft of the femur, various plans have been proposed, each differing in detail, but all agreeing that extension and counter-extension is the safest and most effectual method. Whether the limb shall be maintained in the straight or in the semi-flexed position, is still a disputed point: a large proportion of American practitioners preferring the former plan, while many European surgeons adopt the latter. I am free to confess, that, while I regard the straight position equally as beneficial as the other, I have adopted almost uniformly the semi-flexed; hence, my observations and deductions have been made with especial reference to this position, and not from a comparative standpoint.

Whatever differences may present themselves in the nature and character of the apparatus employed, most writers are agreed as to the necessity of enforcing the following regulations:

1. The ends of the broken bones are to be steadily maintained on a line with each other.
2. Care must be exercised that no *shortening* occurs.
3. The limb should be maintained in a *slightly* everted condition, it being the most natural position when the body is dorsally recumbent.
4. Sloughing of the heel must be prevented, and also fretting and galling of all parts exposed to the action of bandages or dressings.

To accomplish these purposes, various plans have been proposed, all tending to produce the same desirable results.

Mr. Pott, of England, advocated the plan of laying the patient on the affected side, the thigh at right angles to the trunk, and the knee bent in a semi-flexed position, and supported upon smooth

pillows ; with a many-tailed bandage and two broad splints applied between the pelvis and knee.

A *second* plan consists in maintaining the limb in position by the double inclined plane ; and it cannot be denied, says Professor Gross, "that very excellent cures are occasionally effected with it." It is adapted to fracture at the upper portion of the thigh, involving the neck and condyles, where there exists a constant disposition to displacement of the lower extremity of the upper fragment. The extension is made mainly by the weight of the leg and foot, the counter-extension being kept up by the weight of the body and the pressure made by the instrument against the tuberosity of the ischium. The apparatus most frequently used in this country is McIntyre's Splint, or double inclined plane, as modified by Liston.*

The *third* is extension in the straight position. In this, as in all fractures, the more simple the apparatus, the more readily it is applied, and the more efficient it becomes. With mechanical skill, tact, and knowledge of the anatomy of the parts concerned, almost every practitioner will be enabled to adopt the requisite means necessary in each case to effect a successful result.

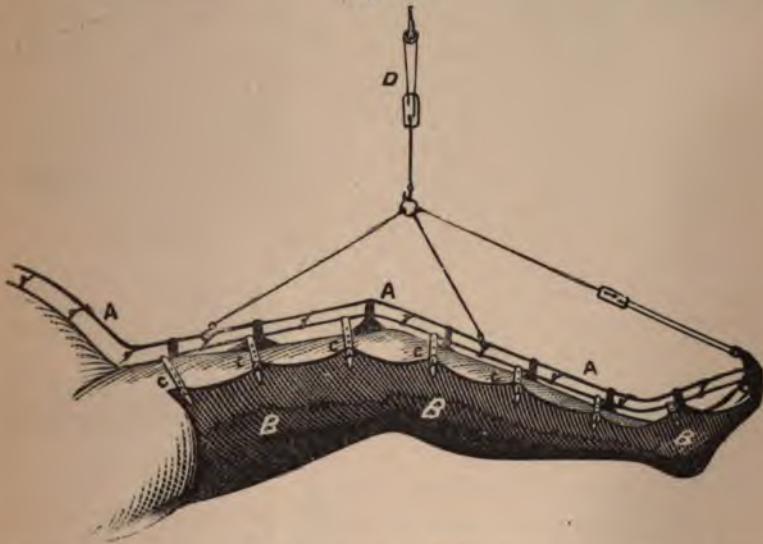
Hodge's Splint.—This is a valuable addition to Liston's long splint, and consists of a bar of wrought iron attached to the upper and outer part of the splint by means of bolts or screws, and bent either to the right or left, according to the side for which it is required. The splint should be sufficiently wide to allow the bar to pass free of the patient's arm and shoulder. Then the adhesive strips, as previously described, are attached by means of a tape to hook at the top of the bar, as shown in Franklin's Surgery, page 458. The advantages of this apparatus are that the extension and counter-extension are made in a straight line ; that the dressings maintain their positions much better than the ordinary ones ; and, the patient being unable to rise, the fragments are less liable to become misplaced.

Smith's Splint.—The anterior wire splint of Professor Nathan R. Smith, has been very highly recommended, especially in gunshot fractures of the thigh and leg. It is simply a frame composed of stout wire, and covered with cloth, which, being suspended above the limb, permits it to be suspended in turn to it by rollers passing around both limb and splints from the foot to the groin ;

* See Franklin's Surgery, p. 446.

and it should be of sufficient length to reach from the anterior superior spinous process of the ilium to a little beyond the toes. The limb is then suspended by means of hooks and cord to the ceiling or frame above the bedstead. The upper hook should be

Fig. 146.



attached over the seat of fracture, and the lower one a little above the middle of the leg, in order to equalize the pressure of the splint. This apparatus is applicable to any fracture of the thigh and leg, and has the advantage of being at the same time light and comfortable. (Fig. 146.)

Buck's Method.—Dr. Buck's method of treating these fractures consists simply of extension and counter-extension, with or without splints, the perineal and crural bands being secured to the bedstead. With this arrangement, there can be no obstruction to the circulation, perfect cleanliness can be preserved, and the limb inspected and measured as often as desirable. It is particularly adapted to compound fractures of the thigh.

I employed this principle of Dr. Buck, with some modifications, in treating gunshot fracture of the femur, in the U. S. General Hospital, at Mound City, Illinois, and in the Good Samaritan Hospital, in St. Louis, with the most gratifying results. The counter-extension is made by a perineal band, composed of India-rubber tubing, about two feet long and one inch in diameter,

stuffed with cotton or flax, fastened by a cord firmly to the head of the bed. Extension is maintained by adhesive strips applied to the leg, to which a cord is attached, which passes through a pulley, fastened to the foot of the bed; and at its distal extremity a weight is suspended, varying in gravity from five to fifteen pounds, according to muscular development. The thigh may be encircled with light parallel splints, placed over the point of fracture, as suggested by Dr. Gurdon Buck.

Hodgen's Method.—Prof. John T. Hodgen, of St. Louis, has devised a simple but valuable apparatus which combines both the principles of the anterior splint of Smith, and the extension of Swinburne, and can be applied, not only to fractures of the

Fig 147.



thigh, but also to those of the leg. The author, from a considerable experience in its use, claims for this apparatus all the qualities necessary for the treatment of simple or compound fractures of the thigh. (Fig. 147.)

A bandage is applied to the foot; an adhesive strap, three inches wide, is applied to each side of the leg, extending four or five inches below the foot, and up to the knee in case of fracture

of the femur; or to the fracture, in case the tibia is the injured part. The roller is then extended smoothly over the adhesive plasters.

That limb of the splint designed to pass next the pubes is bent upward, at a point from the bend of the knee in the splint corresponding to the distance from the bend of the knee to the pubes on the sound side of the body.

Strips of bandage three inches wide are now looped over one limb of the splint, continuously from the upper to the lower end, and allowed to belly downward a distance equal to two-thirds of the diameter of that part of the extremity designed to rest upon each one; the other ends of these strips are pinned over the other limb of the splint, thus forming a double inclined trough, in which the extremity is now to be placed on these strips of muslin. The free ends of the adhesive strips are next fastened to the cross-piece at the foot, three inches apart, and the whole suspended from a pulley fixed to the ceiling, or a frame; the pulley should be almost over the foot, if the ceiling be eight or ten feet high, giving the suspending cords an oblique direction, that in this way we may have sufficient extension. If the patient is disposed to slide toward the foot of the bed, this must be elevated on two bricks under each of the legs at the foot of the bedstead.

The advantages claimed for this arrangement are:

"1. That the limb is entirely free from compressing bandages, so that circulation and nutrition are uninterrupted; consequently repair goes on in its wonted course.

"2. The limb may at any time be examined without disturbing the dressings.

"3. Any one of the supporting strips may be removed and replaced without displacing the fracture; consequently the external wound may be frequently dressed, and all offensive matter removed as often as may be required.

"4. As the perineal band is absent, and the limb is suspended on strips of muslin, there can be no perineal excoriations, no ulceration of the heel, while every part of the limb is kept cool in the hottest weather.

"5. The freedom with which the limb moves, in obedience to impulses received from the hip and upper part of the thigh, allows the patient to sit up, to move to any part of the bed, or lift himself on a bedpan, without disturbing the fracture or causing the least pain.

"All of these requisites are not answered by any splint in general use. Dr. Smith's anterior splint embraces all the qualities required for simple fractures; but it does not admit of the limb being so easily inspected, or offer the same facilities for dressing wounds of the soft parts."

I have employed this splint almost exclusively for the last few years for all fractures of the thigh and leg, and believe it to be the very best apparatus now in use for the injuries referred to.

Compound Fractures of the Femur.—In these fractures, the treatment depends upon the severity and extent of the wound. In either case, the directions heretofore given will amply suffice: if simple, the limb may be put up as fracture of the middle third; if the main vessels are torn, the nerves lacerated, and the injury to the soft parts considerable, amputation is to be considered.

V.—Fractures of the Lower Extremity of the Femur.

These fractures are either *transverse* or *oblique*. When transverse, they occur in young subjects, and follow the line of the epiphysis; when oblique, they are apt to extend into the joint. Treatment is same as the preceding.

VI.—Fracture of the Condyles of the Femur.

This fracture is of rare occurrence, and usually takes place among old persons, in whom the condyles have become atrophied and brittle,—either as the result of a direct blow upon the part, or a fall upon the knee. The fracture may be limited to one of the condyles or implicate both, the fissure extending between the prominences. The fracture may also be compound or complicated, either as the result of direct violence or gunshot injury.

Symptoms.—There is increased width and flatness of the joint, together with great pain and swelling of the part, with more or less shortening of the limb when both condyles are affected. There is complete loss of power in the limb, and crepitation is easily elicited by taking hold of the condyles and attempting to move them in opposite directions.

Prognosis.—The prognosis in injuries of this nature is far from favorable, the knee-joint being generally implicated to such an extent as to cause ankylosis, or at least imperfect action of the part. When the fracture is compound or comminuted, it is

often advisable to perform amputation at once; as by delay the life of the patient may be lost by the resulting mortification, erysipelas, pyæmia, or hectic fever.

Treatment. — The limb should be placed in an easy position, and enveloped in compresses wet with medicated lotions of *Arnica*, *Aconite*, or *Hypericum*, as circumstances demand, until the inflammation has been subdued, after which *Symphytum* internally and externally, as heretofore recommended. The fragments may then be restored to their proper position, and be maintained by either the double inclined plane or extended position: in the extended position if the fracture be transverse; the double inclined plane, if it be oblique, with a strong tendency to displacement. Passive motion may be instituted in about the space of a month; but, despite the most careful attention, says Professor Gross, a good and unexceptionable case will be extremely difficult, if not impossible, especially when both condyles are implicated.

Compound fracture of the condyles involving the knee-joint, if there be extensive laceration of the soft parts, with injury to the popliteal vessels, demands either exsection or amputation, according to circumstances.

SECTION XIV.

Fractures of the Patella.

Fracture of the patella, though by no means a common accident, is still one of great surgical importance, owing to the imperfect union of the fragments, and the subsequent impairment of the functions of the knee-joint. The injury is due in a large majority of cases to direct violence, as falls or blows, while occasionally it is produced by muscular contraction alone. When resulting from the latter cause, the direction of the fracture is found to be transverse, the same being generally true also of fractures occasioned by direct force. Longitudinal, oblique, and comminuted fractures of this bone are extremely rare, but when occurring, usually demand the closest attention, in view of the danger to be apprehended of high inflammatory action, which is exceedingly liable to extend to the interior of the joint, thus complicating the case with synovitis, and perhaps ultimately with more or less complete ankylosis.

Symptoms.—Provided the fracture is transverse, the superior fragment is drawn upward by the action of the quadriceps extensor muscles, the lower fragment being retained in position by the ligamentum patellæ. The interval thus produced between the fragments can be readily detected, and is found to vary in extent from a few lines to four or five inches, according to the degree of laceration sustained by the ligamentous structures surrounding the bone. The patient is unable to stand; the ability to straighten the limb is completely lost. More or less swelling rapidly supervenes, which obscures the diagnosis, especially if the displacement be slight. There is also discoloration of the integuments, owing to the effusion of blood. Crepitation can rarely be elicited, unless the fracture be longitudinal or oblique; as the superior fragment cannot be readily brought in contact with its fellow.

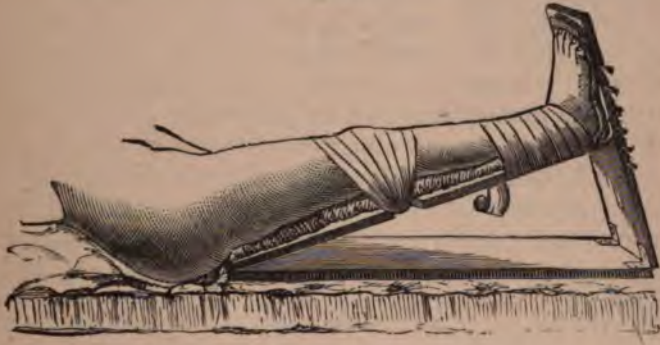
Treatment.—The indications in this fracture are to control the action of the extensor muscles, to bring the broken fragments in apposition, and retain them by means of appropriate apparatus. These indications are accomplished in various ways by different authors. The apparatus of Malgaigne has been found to be very useful. It is easily applied, and, when once in place, does not require to be removed during the whole course of treatment, the amount of pressure being regulated by means of a screw. In applying it, two of the hooks are fixed into the tendon at the upper edge of the bone, and two into the lower; then, by turning a screw, the fragments are brought into place and retained there. Bony union takes place in about six weeks.

Dr. P. S. O'Rielly, of St. Louis, has devised a ring which he claims possesses advantages over the more simple ring used by Dr. Gibson. Dr. O'Rielly's ring consists of a piece of round, tempered steel, of an oval, horse-shoe shape, with the ends turned in and bent upward. On the sides, near the center of a line drawn through the oval part, are loops to receive the band which holds the splint in position. The limb is placed upon one of Day's posterior splints, well padded, and a little wider than the leg, and secured at each end by a handkerchief or roller bandage. The iron ring is then placed in position over the patella, the divided fragments having been pushed together, and the strap buckled sufficiently tight to keep the splint in place. The thumb-screw regulates the amount of concentric pressure desired, and may be tightened or relaxed, as circumstances require.*

* See Franklin's Surgery, p. 467.

Professor Hamilton's method of treating this fracture is by the single inclined plane, of sufficient length to support the thigh and leg, and about six inches wider than the limb at the knee. (Fig. 148.) The plane rises from a horizontal floor, and at its distal end is from six to eighteen inches high, according to the length of the limb and other circumstances. The foot-piece stands at right angles with the inclined plane, and is perforated with holes for the passage of bandages to secure the foot. After recovery, a pasteboard or leather cap should be worn around the joint for some time, and until the ligamentous bands which unite the fragments have attained the necessary degree of firmness to resist

Fig. 148.



any ordinary force to which they may be subjected. The duration of treatment is about six weeks, the cap then being placed over the joint as above directed. The inflammation must be combatted by the remedies already given, and *Symphytum* administered both internally and locally.

Compound fracture of this bone involving the knee-joint, must be treated upon the principles already laid down. If very severe, operative procedure may become indispensable.

SECTION XV.

Fractures of the Bones of the Leg.

Simultaneous fracture of the tibia and fibula commonly occurs as a result of direct violence, as a blow, or the passage of a loaded vehicle. Of indirect causes, the most frequent are falls upon the

feet from a height, while occasionally the accident results from muscular contraction.

The *seat* of the fracture is confined, in a considerable majority of cases, to the lower third of the leg. "The two bones may give away at opposite extremities. Though it is often difficult, and sometimes quite impossible, to determine precisely where the fibula is broken, usually the point of fracture in the tibia is between two and three inches above the joint, where the bone is weakest."

Fractures of the bones of the leg may be simple, oblique, comminuted, or compound; the two latter varieties being more frequent here than in any other portion of the skeleton.

Symptoms.—The characteristic signs of fracture—to-wit, preternatural mobility, crepitation, and deformity—are commonly so well marked in the accident as to render the diagnosis easily determined. The shortening, when it exists, may vary from one or two lines to three-quarters of an inch, being rarely more than this, on account of the office performed by the interosseous ligament. In addition to the above symptoms, there are swelling and discoloration, the latter often being very considerable from infiltration of blood poured out of the anterior or posterior tibial artery or veins, which are frequently wounded by the displaced fragments.

Treatment.—When the fracture is transverse, the leg should be confined in a tin case or simple fracture-box, and any tendency to displacement counteracted by the use of compresses or short splints, care being taken to keep the great toe on a line with the inner border of the patella, thus preventing rotation of the ends of the fragments upon each other; or the limb may be confined in a starch bandage, after the subsidence of the inflammation and swelling; and perhaps in many cases this latter is the better method, as by its use the patient is able at the end of a week or two to get up, and move about by the aid of crutches, the limb being supported by a sling passed around the neck. In *oblique* fracture of the leg, it will be found necessary to employ extension and counter-extension, in order to keep the fragments in apposition. The apparatus of Dr. Neill is found very useful in these cases; it consists of a box reaching as high as the middle of the thigh, the extension being made by means of adhesive strips fastened to the footboard, and counter-extension by means of

adhesive strips passed through holes in the upper end of the box, and tied on the outside.*

The McIntyre splint as modified by Liston, is also of value in the treatment of these fractures. It may be found described under the head of "Fractures of the Thigh," pp. 290-291. Swinburne's method of treating this fracture is by means of a long, narrow splint and foot-piece. The foot-piece is fastened to the foot by adhesive strips, while counter-extension is made from the knee by means of adhesive strips looped about the limb below the joint. A strong cord is then passed through the loop, and then through a hole in the splint opposite the lower part of the thigh, in order to afford the requisite degree of tension. In order to keep the apparatus steady, a few strips of plaster may be passed around the limb and splint. In fractures of this kind, it has been recommended to suspend or sling the limb by means of a suspending apparatus, thus affording greater relief to the patient with less risk of disturbing the healing process going on in the fractured extremities.

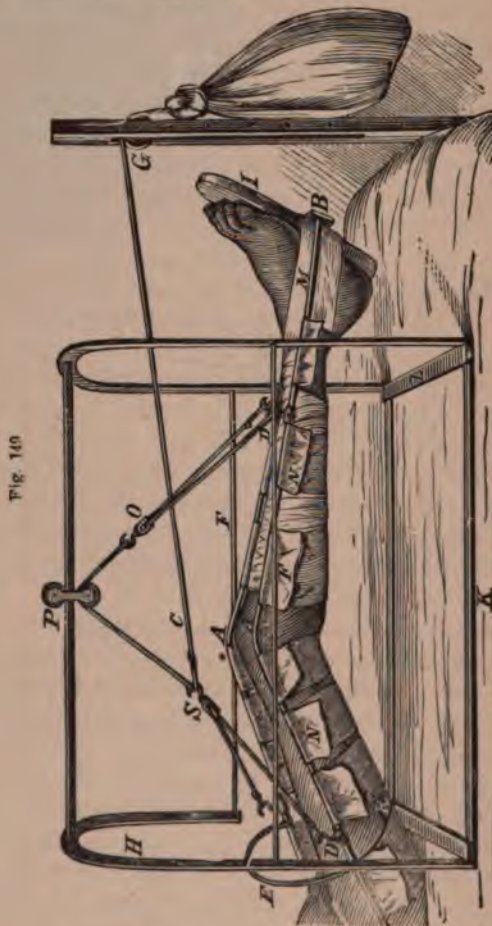
Clark's Apparatus.—The following suspension apparatus is claimed by the author to be an improvement over those invented by Crandall, Salter, and Neill, not only as a means of extension and counter-extension, but also in its adaptation to the treatment of compound fractures. (See Fig. 149.)

The apparatus is such as may be made by any blacksmith, or, indeed, by any ingenious surgeon in a case of necessity; as a wooden frame and two hoops, with a common iron pulley, may be made to answer quite as well as the instrument which I have had made of iron on the following plan:

The two arches, represented by the letter H at one end, are made of iron bars one-eighth of an inch in thickness, and three-fourths of an inch in width, and are continuous with the bottom pieces (K), which rest upon the bed, and measure twenty-two inches in length. The arches are also supported on the sides by the two slender bars or rods (F F); while the bar supporting them at the top, upon which the pulley (P) glides, should be made flat, with the long diameter vertical, and of sufficient strength to prevent it bending with the weight of the leg. The width of the arches, as indicated by the letter L, should be fifteen inches, and their height eighteen inches from the surface of the bed.

* See Franklin's Surgery, p. 472, "Fractures of the Leg."

This description will be sufficient to indicate the proportions of the exterior apparatus; and the leg in position will sufficiently explain the method of applying it.



I. — Fracture of the Fibula.

Fracture of the fibula may occur at any part of its extent, and is readily recognized by simple manipulation; the mobility of the fragments, crepitation, and displacement being easily detected.

The degree of the deformity, however, is commonly slight, owing to the support afforded by the tibia, which acts as a splint in maintaining the broken extremities of the bone very nearly in

apposition. The accident may occur as a result of force applied to the plantar surface of the foot, as in falling or jumping from a height; from a sudden twisting of the ankle; or in consequence of direct blows.

The more serious accident, however, implicating the fibula, is what is commonly known as "Pott's Fracture," the seat of the fracture being confined to the lower fifth of the bone, and complicated with dislocation of the tibia from the corresponding surface of the astragalus. The foot is strongly everted by the action of the peronæus longus, while the heel is somewhat elevated by the muscles of the calf. The internal lateral ligament is ruptured, and the internal malleolus projects inward, thus producing considerable deformity. Not infrequently there is also fracture of that portion of the tibia which is more immediately connected with the fibula.

Treatment.—The indication is to place and maintain the foot in a position the reverse of that which it assumed in consequence of the injury. This is best accomplished by the employment of Dupuytren's apparatus, as shown in Fig. 150. It consists of a

Fig. 150.



A side view of Dupuytren's Pad and Splint, for the treatment of fracture of the lower fifth of the fibula, as applied to the right limb. (After Nature.)

light wooden splint, reaching from the upper third of the leg to about three inches below the sole of the foot, and a wedge-shaped cushion reaching from the same point to the ankle. The limb is then enveloped by the common bandage, care being taken not to compress it opposite the site of fracture; the apparatus is stretched along its inner surface, with the tapering end of the pad upward, and secured, first above and then below, the roller being passed around the foot and ankle, so as to turn the internal margin of the foot upward and inward. The limb may afterward be kept in the extended position, or be placed half bent upon its outer surface. The parts should be carefully watched, the dressings changed from time to time, and passive motion instituted at the end of the third week.

II.—Fracture of the Tibia Alone.

Fractures of the tibia alone, are produced, in a large majority of cases, by the application of direct violence, though they are sometimes occasioned by falls upon the foot. The accident is generally complicated with fracture of the fibula. The fracture is generally oblique, and seated in the lower fourth of the bone, the particular form of displacement depending upon the direction of the fracture. Thus, if the separation occurs from above downward and forward, the fragments will override each other, the lower one being drawn upward and backward by the action of the gastrocnemius and soleus muscles; provided, however, the direction of the fracture be from above downward and backward, the heel will be drawn upward by the same muscles, thus causing the inferior fragment to project forward. In either case, the sharp extremity of bone is liable to protrude through the integuments, and produce a compound injury.

Treatment.—Fractures of the tibia, at whatever portion of the limb they may occur, are best treated by means of the tin case, so shaped as to fit the limb. It should reach a few inches above the knee, and be provided with a foot-piece. The limb should be bandaged in the usual manner, and any tendency to displacement counteracted by the use of a compress, so arranged as to bear equally upon the ends of the fragments. In speaking of this manner of treatment, Professor Gross remarks: "I have never found it necessary to employ any other apparatus than the tin case, no matter where the tibia has been broken." Another method of treating fracture of the tibia, in the upper extremity, extending into the condyles, is to place the limb in a straight position, so that the condyles of the femur may act as a splint and preserve the broken parts in their places, extension and counter-extension being maintained by two long splints. The whole limb should be raised so as to relax the extensor muscles of the knee. *Pasteboard* or *felt* splints and starched bandages may also be applied to keep the joint motionless, "care being taken that they do not cover the front of the knee." Passive motion should be commenced in about five weeks. In treating these fractures of the body of the bone, the wooden splints of Dr. Welch and the wire apparatus of Dr. Bauer will be found exceedingly efficient,—the latter being particularly valuable on account of its light, airy, and pliable character. Hodgen's splint

answers an admirable purpose in this as well as other fractures of the leg. The treatment will be the same as in ordinary cases.

SECTION XVI.

Fractures of the Tarsus.

The bones of the tarsus are rarely the seat of fracture, though any of them are liable to this variety of injury.

The *astragalus* may be broken in consequence of falls upon the feet, or, more rarely, by being crushed between opposing bodies. Commonly, very little or no displacement occurs; and, owing to its situation, the character of the surrounding structures, and the severe swelling ensuing, the true nature of the case is not always readily determined. Crepitation, which can ordinarily be elicited, will, however, serve to establish the diagnosis.

Fracture of the *calcaneum* may result from the same causes as those producing a like injury of the *astragalus*, while it is also liable to be broken by violent contraction of the *gastrocnemii* muscles. When produced by the latter cause, the line of fracture is always situated at some point intermediate between the *astragalus* and the insertion of the *tendo Achillis*, in which case the posterior fragment is liable to be drawn upward.

The *symptoms* pointing to fracture of this bone are pain, slight displacement, together with swelling, crepitation, and loss of motion in the foot.

The other bones of the tarsus are rarely broken, except by the application of such violent force as renders the injury compound, and of so serious a character that immediate amputation in a majority of cases promises the only proper resource.

Treatment.—In fracture of the *astragalus* without serious lesion of the ankle-joint or soft parts, an attempt may be made, by extension and pressure, to restore the parts to their natural position; but, failing in this, recourse must be had to excision.

In fracture of the *calcaneum*, where there is no displacement, it is only necessary to keep the foot and leg in a quiet, relaxed condition, with a tin case, or two side splints, the inflammatory action being subdued by the usual remedies. Where there is displacement, the best mode of treatment is by means of a short

splint applied to the anterior part of the limb. It should be adapted to the shape of the limb, be well padded, and reach from the middle of the leg nearly as far as the toes. By this means the leg and foot are maintained in an extended position, and the muscles of the calf relaxed. The upper fragment is kept in place by applying adhesive strips and a compress around the heel and sole, and then bandaging the foot and leg in opposite directions. This position should be maintained for about six weeks. The inflammation, which in some cases is considerable, should be combatted by the usual remedies.

SECTION XVII.

Fractures of the Metatarsus and Phalanges.

Fracture of the *metatarsal* bones results from direct blows, or from the passage of heavy vehicles, and is commonly accompanied by complications of so serious a character that amputation becomes a necessary resource sooner or later. It is also to be observed, that the usual persistence of inflammatory action in the dense fibrous structures surrounding these bones, is particularly liable to occasion caries or necrosis of the injured bone. This is frequently the case in injuries that seem comparatively slight.

Provided only one of the metatarsal bones is broken, little or no displacement will ordinarily occur; there are, however, occasional exceptions to this rule, while a considerable degree of deformity is apt to result in case two or more of them are broken at the same time.

In conducting the *treatment*, great care should be exercised to coaptate the fragments as perfectly as possible, as the slightest variation is likely to produce more or less serious inconvenience; and considerable force, by way of depressing or elevating the fragments, may with propriety be employed, unless the displacement should result in consequence of muscular contraction: in the latter case, such a course is inadvisable. Apposition is to be maintained by pasteboard splints, compresses and roller, combatting the inflammation by the use of medicated dressings, as previously advised.

The *phalanges* are liable to be broken by the same class of causes that produce fracture of the metatarsus; and, like the

latter, are generally so severely injured as to necessitate their removal. In case, however, it be thought advisable to attempt the saving of the toe, it should be supported by a long and broad splint extending the entire length of the foot.

Compound fractures of the leg and foot are to be treated on the same general principles already laid down. When there is much contusion of the soft parts, *Arnica* is the appropriate remedy; *Hypericum* for laceration of the soft tissues, and *Calendula* for suppurative action consequent upon the injury to the soft tissues. In all cases of fracture, when bony union is tardy, great benefit will be derived by the internal and external use of *Symphytum*. I have witnessed the most marked benefit follow the use of the latter remedy, and especially in those cases where ossific union, from constitutional or other causes, seemed indisposed to take place. In one case of fracture of the patella, occurring in a lady over sixty years of age, and where bony union failed to take place under ordinary treatment, this remedy produced the most gratifying results, inciting the parts to a healthy action, and bringing about perfect osseous union in less than three weeks. This is only one of many cases where I have witnessed the brilliant effects of *Symphytum* in restoring vital action, and in bringing about bony union.

CHAPTER XXIV.

Dislocations.

SECTION I.

General Considerations.

A DISLOCATION, or luxation, is the partial or complete displacement of the articular surfaces of the bones entering into the formation of a joint.

Varieties of Dislocations.—Dislocations are primarily classified as: 1. Accidental, or traumatic, including those in which the displacement is caused by the application of external violence, or by muscular action; 2. Spontaneous, or pathologic, those

occurring slowly, in consequence of disease; 3. Congenital, embracing those observed at or soon after birth.

For convenience of study, a further classification of dislocation has been adopted, according to the *position* which the displaced bone assumes; and they are hence described as *complete*, *incomplete*, *primitive*, and *consecutive*, according to the amount of injury sustained by the surrounding tissues; they are also designated as *simple*, *compound*, and *complicated*; and, according to the duration of the injury, are divided into *recent* and *old*.

1. A *complete* luxation is one in which the articular extremities of the bone are entirely separated from each other.

2. An *incomplete*, *partial*, or *subluxation*, is one in which the articular surfaces remain partially in contact.

3. A *primitive* luxation is one in which the bone remains in the position in which it was originally thrown.

4. In *consecutive* or *secondary* luxation, the bone, in consequence of muscular action, or unsuccessful attempts at reduction, is moved into some new position.

5. By *simple* luxation is understood one in which there is, comparatively, but little injury done to the adjacent soft parts.

6. In *compound* luxation, a wound communicates with the joint.

7. A *complicated* luxation includes some other injury, in addition to the loss of the normal position of the bones; as, for example, a fracture, or extensive laceration of important blood-vessels, ligaments, muscles, or nerves.

8. A *recent* luxation is one that has occurred within a few days or weeks, or, more properly, one which is capable of being successfully reduced, whatever the time.

9. An *old* luxation is to be regarded as one that has existed for so long a time as to prevent the bones from being placed in their natural relations.

Seat.—Nearly all the joints are subject to dislocation. Those, however, admitting of varied and extensive motion, as the ball and socket joints, are far more liable to it than any of the other articulations, while in some of the synchondroses it never occurs. The shoulder, in consequence of its peculiar structure, the glenoid cavity being extremely shallow, the capsular ligament long, and the surrounding muscles numerous and powerful, while the joint admits of the greatest freedom of motion, is, as we would expect,

the most frequent seat of this variety of injury. And, indeed, according to the table of Malgaigne, it appears that luxation occurs here more frequently than in all of the other articulations combined. Thus, out of 481 cases, 321 were observed in this joint, 34 in the hip, 33 in the clavicle, 26 in the elbow, 20 in the foot, the remaining 47 occurring in the thumb, wrist, and jaw. It also appears, from the investigations of the same author, that they occur most frequently between the thirtieth and sixty-fifth year, being rarely met with under five years of age, or subsequent to the eightieth year.

Causes.—The principal *predisposing* causes of dislocation include freedom of motion of the joints, relaxation of the ligaments, disease of the extremities of the bones, paralysis, or atrophy of the surrounding muscles, exposure of the joint, its anatomical structure, and the peculiar function of the bones entering into their formation. Age may also be said to exert an influence; while, also, those persons of feeble constitutions, with their muscular systems much reduced, are particularly liable to suffer this accident. The exciting causes are mechanical violence and muscular contraction. The former may operate either directly or indirectly. Thus, for example, dislocation of the humerus may occur from the application of direct violence, exerted by a blow, or fall upon the shoulder; the hip or the patella may also become displaced in consequence of force applied in like manner. More commonly, however, the accident is observed as a result of indirect violence; as when the wrist, elbow, or shoulder becomes luxated from a fall upon the hand; or the hip, from force applied at the knee.

Muscular contraction, dependent either on disease, spasmodic action, or voluntary effort, may become sufficiently powerful to occasion spontaneous or pathologic luxation; such a result being sometimes met with, in the first instance, in consequence of chronic rheumatism, or of coxalgia; secondly, from convulsions; and, lastly, from violent action, as in hurling a weight. It is further to be observed, however, that some persons have the ability to luxate particular joints with the greatest facility, by simple voluntary action; while in all cases of this accident it is evident that muscular contraction plays a most important part. Thus, a man in a state of intoxication, owing to the relaxed condition of his muscular system, rarely suffers dislocation of any of

the joints; while a force capable of producing this result almost invariably in a live subject, will be found wholly incompetent to effect a luxation in the cadaver.

General Symptoms.—The symptoms attending dislocations are generally so well marked as to enable the surgeon to detect, without difficulty, the true nature of the injury. The more constant and characteristic of the phenomena presented are, the immediate loss of function, deformity, and change in the length and axis of the limb.

Loss of function of the joint is an inevitable consequence of dislocation, and necessarily continues, more or less complete, until reduction of the displaced bone is fully accomplished. In case of luxation of the joints of the superior extremity, for example, it will be found that the patient is unable perfectly to execute the motions peculiar to the limb, as flexion, extension, pronation, supination, and circumduction, while in some instances motion is completely destroyed; and hence immobility of the affected articulation becomes a very prominent and valuable symptom.

Deformity, occasioned by the new position assumed by the displaced bone, is a constant and most reliable symptom of dislocation. This is frequently so great as readily to be detected by the eye, the superimposed structures being raised into a distinct prominence; or in other cases, as in the luxation of the humerus, the articulation presents a marked flattened appearance. Provided, however, the displacement be slight, or the tumefaction so great as to obscure the deformity, careful manipulation of the parts will disclose the true position of the bone.

The *length and axis* of the limb are subject to marked change, and also afford valuable symptoms in determining the nature of the injury. The affected limb may be either increased or diminished in length; though shortening is by far more frequent than elongation.

The *axis* of the limb being almost invariably changed, often gives the parts a rigid and peculiarly unnatural appearance, which is often alone quite sufficient to indicate the true character of the injury. This is especially the case in dislocations implicating the elbow, and in the downward luxation of the head of the humerus. There are other symptoms, such as pain, numbness, swelling, contusion, and discoloration, together with the presence of *moist crepitus*, exhibited after the occurrence of inflammation,

which may be regarded as valuable in conjunction with the evidence afforded by the more prominent symptoms just mentioned.

Diagnosis.—There are a variety of affections with which dislocations are liable to be confounded, as *sprains, fractures, displacement of the articular cartilage, laceration of the ligaments, and chronic diseases of the joints*. Of these, however, fracture in the vicinity of the joints is, without doubt, the most frequently confounded with luxation; and, hence, the differential diagnosis concerning these injuries merits the closest study.

Differential Symptoms between Dislocation and Fracture.—Dislocations are characterized by loss of function, deformity, impaired motion, difficulty of reduction, pain, swelling, and contusion; while in fractures, there are impairment of function, distortion, preternatural mobility, crepitus, facility of reduction, together with pain, swelling, and contusion. It will now be observed, by a comparison of the symptoms, that many of them are possessed in common by the two injuries, and are consequently of no value whatever as diagnostic symptoms. For example, loss of function is quite as frequent in one as in the other, and generally as complete; while the deformity, pain, swelling, contusion, and discoloration, as exhibited in each, present nothing characteristic by which a correct diagnosis can be determined.

The existence of crepitus, preternatural mobility, and facility of reduction, however, as almost invariable attendants of fracture, include the differential signs by which the distinction between fractures and dislocations is made.

1. The *preternatural mobility* consequent upon fracture, by means of which the limb can be flexed, extended, and moved about in various directions, never exists in case of luxation; the mobility of the limb, in the latter instance, being wholly lost, or, at least, greatly restricted. The dislocated bone, also, will be found to occupy a certain position, common to all luxations of a similar character. In case of fracture, also, the displaced member can readily be returned to its normal position, but, when reduced, will not remain in place without the application of external support; whereas, in luxation, the replacement of the bone frequently requires the most skillful manipulation, but, after its reduction has been effected, is rarely dependent upon external support to hold it in position.

2. The existence of *crepitus* affords one of the most important and characteristic signs of fracture, and is never present in any case of uncomplicated dislocation. Hence, if true *crepitus* be present in any instance, whatever the character of the concomitant symptoms, the case is evidently one of fracture. But, notwithstanding *crepitus* never exists independent of fracture, still, all accidents of this nature are not necessarily accompanied by a sensation of *crepitus*, however carefully the manipulation may be conducted; although it is almost invariably present, and can generally be detected without difficulty. The only symptom simulating it in luxations, is what has been termed *moist crepitus*, which consists in a kind of rasping or friction sound, sometimes observed on the second or third day after dislocation, produced, undoubtedly, in consequence of fibrinous effusions.

3. *The facility of reduction*, as observed in ordinary cases of fracture, affords another valuable symptom by which the two affections can be distinguished. While in fracture, simple extension and counter-extension, exerted in the line of the axis of the limb, sufficient to make it assume its normal length, will ordinarily place the parts in perfect coaptation, it will be found, on the contrary, that in dislocation the dislodged bone is not so readily reduced, while its replacement is generally accompanied by a distinct snapping noise, as the articular surfaces assume their normal position, which is never observed in cases of fracture. In dislocation, also, the action of the structures surrounding the joint is sufficient to hold the bones in their normal position, while in fracture there is an immediate return of all the previous symptoms so soon as the extension and counter-extension are discontinued.

Prognosis.—In cases of ordinary dislocation, especially if attended to early, a favorable prognosis can usually be given; whereas, on the other hand, if the case be badly treated, neglected, or complicated with fracture, or serious injury of the adjacent textures, violent arthritis may ensue, accompanied by constitutional and local disturbance, sufficient to endanger, not only the limb, but even the life, of the patient. Luxations of the orbicular joints, though commonly more difficult of reduction than the ginglymoid, retain their capability of replacement much longer than the latter, and are less frequently attended by unfavorable results. A dislocation of the shoulder, for example, may con-

tinue for several months, and it may still be restored to its original position, and the function of the articulation be regained; while the elbow, or other ginglymoid joints, will become irreducible in a few weeks, and hence be comparatively useless.

Pathology.—A careful dissection of a recently luxated joint, occasioned by mechanical force, reveals the capsular ligaments more or less torn, with contusion, stretching, and laceration of the muscles, ligaments, nerves, and arteries; while the extremity of the bone will be found removed to a greater or less distance from its socket, and resting upon some of the soft structures or adjacent bone. The socket will generally be occupied by blood effused from the lacerated vessels, which may be either in a fluid state or partially coagulated.

In dislocations from muscular action, the ligaments are only slightly torn, and it is probable that in some cases no rupture whatever occurs; though more or less contusion and lengthening of these structures must necessarily be present in every instance.

Provided the dislocation remains unreduced, inflammatory action results, with effusion of plastic matter, gluing the neighboring tissues together, while the cavity of the socket becomes filled with a fibrous or bony deposit, which completely obliterates, eventually, this portion of the joint. Not unfrequently the effused lymph contracts strong and extensive adhesions to the bone, including important nerves and blood-vessels; in which event attempts at reduction may be attended with severe laceration of an artery, and aneurism or death from hemorrhage ensue in consequence. Important changes also gradually supervene in the immediate vicinity of the head of the bone; the hard or soft textures upon which it rests in its new position become in a measure absorbed by continued pressure, while subsequently an osseous deposit occurs around the head of the bone, forming a new articulating cavity. The margins of the new socket, formed by thickened and condensed fibrous tissue, are more or less firmly attached to the neck or shaft of the bone, and the whole surface is lubricated with synovial fluid. In consequence, however, of the continued inactivity of the limb, the muscles gradually become atrophied, and in some instances their function is completely destroyed.

Treatment.—The *first* indication to be complied with is the immediate reduction of the luxated bone; *secondly*, to retain it in

position and at perfect rest, until the injured structures are repaired; *thirdly*, to combat inflammatory action, and lastly, to restore the functions of the joint.

1. *Reduction* consists in restoring the dislocated bone to its natural relations; and hence the obstacles to be surmounted are, first, to engage the surgeon's attention in determining the means best adapted to accomplish this result. Of the causes opposing the ready and immediate reduction of dislocations, the resistance offered by the spasmodic action of the muscles connected with the displaced bone, is not always, as formerly supposed, the chief agent in preventing the restoration of the displaced bone to its natural position, though commonly this is undoubtedly the case. The barriers interposed in consequence of osseous prominences, and the frequent entanglement of the head of the bone among the surrounding muscles and tendons, must necessarily, in many cases, offer a serious embarrassment to the efforts of the surgeon; while, in particular instances, the reduction is not only impeded, but wholly prevented, by the resistance afforded by the capsular ligament, the rent made through it by the passage of the head of the bone being almost entirely closed by contraction of the edges of the aperture around the neck, in consequence of which the head is unable to re-enter the capsule.

The means commonly employed for overcoming these and whatever other obstacles may exist, include *extension* and *counter-extension*, *pressure*, *rotation*, and *circumduction*, aided, if necessary, by the administration of agents to produce relaxation of the system. In order, however, that manipulation or the application of mechanical contrivances may prove effectual, it becomes a matter of the first consequence that the surgeon thoroughly acquaint himself with the exact relation which the displaced bone sustains to the neighboring structures, and understand what muscles and ligaments antagonize the reduction. This will, of course, demand a ready knowledge of anatomy, physiognomy of the joint, and a perfect familiarity with the functions of the individual structures influencing the various movements of which the articulation is capable.

Extension consists in the application of force to overcome the contraction of the muscles, while *counter-extension* is the opposing force preventing the yielding of the entire limb or body. These means may be exerted by the use of pulleys, napkins, sheets, or by the hands of the surgeon and assistants. In all cases the

extending power should be exerted slowly and continuously, as otherwise the spasmodic action of the muscles is increased, while there is also danger of creating other mischief. Moreover, the extension should be made in the line of the dislocated bone, its axis being gradually changed as the bone assumes its normal position.

Formerly this method of extension and counter-extension was employed most *heroically*, aided by bleeding *ad deliquium*, and the free administration of Antimony, Tartar Emetic, Opium, etc. Among the recent improvements in practical surgery, however, not the least worthy of notice is the application of scientific and intelligent *manipulation* in the reduction of luxations, by which *rotation* and *circumduction*, aided by gentle *pressure*, will almost invariably accomplish what great force has frequently failed to effect.

The facility of reduction will, in all cases, be materially increased by successfully diverting the patient's attention at the moment of making an effort to effect the restoration of the bone. This can usually be done by conversation, or by some sudden exclamation, or unexpected news. In the event, however, of the continuation of spasmodic action, it may become advisable to employ an anæsthetic. By this auxiliary measure every voluntary muscle may be perfectly relaxed, while the patient is, at the same time, exempt from the pain which might otherwise be unavoidable. Ether and Chloroform, mixed in the relative proportions before given, will be found the most reliable and effective agent, and should never be neglected in cases long resisting the efforts of the surgeon.

2. In order to fulfill the second indication, it will be necessary to prevent all motion of the injured joint; as the additional irritation which would otherwise be induced, could not fail to increase the inflammation of the contused and lacerated structures, and thus impede the healing process. To accomplish this, if the injury is situated in the lower extremity, the patient should be placed in an easy or reclining position, and the necessary bandages and splints applied to keep the bone in place. If, on the contrary, one of the upper extremities be affected, the limb should be supported by a sling, having appropriate bandages previously applied, and the patient be permitted to walk about.

3. The inflammatory action is to be combatted by the use of *water dressings*, which should be medicated with *Arnica*, *Ruta*

grav. or *Rhus radicans*; and, if the injury be severe, they should be applied warm for the first forty-eight hours, the same remedy being administered internally. *Aconite* will be appropriate in every case where there exists marked febrile reaction.

Rhus tox. or *Ruta grav.* should be exhibited, provided there be evidence of injury sustained by the tendons.

4. To restore the functions of the joint, and thus prevent the occurrence of ankylosis, requires that passive motion be instituted as soon as the inflammation is subdued. It should be practiced gently, though perseveringly, at first, once or twice per day, and afterward more frequently, until the motions of the joint can be performed voluntarily. The absorption of the fluids effused into the cellular tissue, may be promoted by the cold douche, friction with the dry hand, Electro-Galvanism, and attention to the general health, and by the internal use of *Apis*, *Ars.*, *Bry.*, *Rhus*, *Hellebore*, *Iodine*, and *Merc.* *Ruta grav.* or *Mezereum* may be preferred where the periosteum is injured, or the ligaments of the joint have suffered in consequence of the injury.

In the future conduct of the case, such remedies will be required as existing circumstances demand. Indications for their use will be found in Franklin's Surgery, Vol. I; subject, "Inflammation and its Treatment."

Compound Dislocation. — Compound dislocation is a dangerous complication, in consequence of the synovial inflammation, ulceration of cartilage, and violent constitutional disturbance, with which it is liable to be followed. The question of amputation will depend on precisely the same contingencies as in compound fracture; viz., old age, shattered constitution, comminution of the bone; extensive bruising or laceration of the integuments, so that the wound cannot be closed; laceration of large vessels, etc. To save the limb, the dislocation must be reduced; if the end of the bone protrude through the skin, and reduction is rendered impossible, the aperture should be slightly enlarged, or the end of the bone sawed off, so as to effect reduction; the wound must then be closed, and covered with a soft compress, saturated with a lotion of *Hypericum*, *Ruta*, or *Calendula*, according to the nature of the tissues most involved in the injury. In all essentials the case should be treated as a wounded or injured joint.

Dislocation and Fracture.—In a case involving both of these injuries, it is recommended that the fractured bone be first well secured in bandages and splints, and the dislocation be reduced immediately afterward. If the dislocation is not attended to until after the fracture has united, it may become exceedingly difficult, and perhaps impossible, to reduce it after the lapse of time. Again, in the attempt at reduction afterward, the bone may be broken, and thus seriously jeopardize the success of the case.

SECTION II.*

The Various Dislocations.

I.—Dislocation of the Lower Jaw.

The lower jaw is occasionally dislocated by direct violence, but more frequently by muscular action,—by the sudden and spasmodic action of the external pterygoid, at the moment when the mouth is wide open in yawning, laughing, etc. The condyle is drawn forward into the zygomatic fossa. This may occur on one side only, or on both.

Signs.—The chin is protruded, the mouth is open, speech and deglutition are very imperfect, saliva flows from the mouth, and the condyle can be felt under the zygomatic arch. When one side only is affected, the signs are less distinct. The chin is then pointed to the sound side.

Reduction.—Our aim is to direct the condyle downward and backward. With this view, the surgeon protects his thumbs with a napkin, and then introduces them on the inside of the molar teeth on both sides. By this means he is able to lay firm hold of the angles of the jaw, which he bears downward and backward, at the same time that he raises the point of the chin with his fingers. After the dislocation has been reduced, the patient should wear a four-tailed bandage upon the chin for a sufficient time to prevent recurrence. Applications of Arnica or Ruta may be applied to the articulation for relief of pain, etc.

* This section is taken from W. F. Clark's Manual of Surgery, on account of its point and conciseness.

II.—Dislocation of the Clavicle.

The *sternal end* of the clavicle may be displaced either forward or backward, in front of the sternum or behind it.

The *treatment* consists in making extension by putting a pad in the axilla, or by drawing the shoulders back, as in fracture, and then keeping the end of the bone in its place by a suitable arrangement of pads and bandages.

Fig. 151.



The *outer end* of the bone is generally dislocated upward, on to the acromion. Sometimes the bones are merely separated without any overriding. In these cases, as it is the acromion which is forced away from the clavicle, it seems more in harmony with the general rule to speak of the injury as *dislocation of the scapula*.

The *treatment* must be conducted on the same principles as in the preceding case.

Although it is easy to reduce a dislocation of the clavicle, it is extremely difficult to keep the bone in its proper place. Indeed, it is probable that some slight amount of deformity will always be left after this accident.

III.—Dislocations of the Shoulder.

Dislocations of the shoulder are more frequent than those of any other joint. This arises from the shallowness of the glenoid

cavity, the size and shape of the head of the humerus, the extent of its movements, and the position of the joint, which is not only much exposed to direct violence, but has also to bear the shock of falls on the hand.

The shoulder is liable to four dislocations: 1. *Downward, into the axilla*; 2. *Forward, beneath the clavicle*; 3. *Backward, on to the dorsum of the scapula*; 4. *A partial dislocation forward*, where the head of the bone rests on the edge of the glenoid cavity and the coracoid process.

Signs.—Whatever may be the precise nature of the injury, there is pain, loss of power, and immobility; the shoulder has lost its roundness, and looks angular; the acromion projects, and there is a marked depression below it; the head of the bone may be felt in an unnatural situation.

But, besides these signs, which are common to all the varieties, each has its own peculiar marks.

In the *first* variety, the head of the humerus may be felt in the axilla, the arm is lengthened, the elbow points outward, and there is numbness from pressure on the axillary plexus of nerves. This dislocation is the most common of all.

In the *second*, the head of the humerus may be both seen and felt below the clavicle, the arm is shortened, and the elbow points outward and backward.

In the *third*, the head of the humerus may be felt on the dorsum of the scapula, and the elbow points forward.

In the *fourth*, the head of the humerus may be seen and felt under the coracoid process.

Reduction.—There are two methods of treating dislocation downward into the axilla: The one consists in making extension by drawing the arm *downward* and *outward*; the other, in making extension by drawing the arm *upward*.

If the *first* method is adopted, the patient should be stripped, and laid flat upon a couch. If need be, he should be placed under the influence of chloroform. The surgeon, having taken off his boot, seats himself on the margin of the couch, facing his patient; and, having grasped the dislocated limb at the wrist with both his hands, he places his near foot in the arm-pit, so that the hollow of the foot fits into the fold of the axilla. He then draws the arm slowly downward and inward, at the same time that he presses steadily with his foot.

If more force is required, a jack-towel may be fastened around the arm above the elbow by means of the "clove-hitch," so that an assistant may draw upon it; or the pulleys may be applied.

The same principle of reduction may be carried out by seating the patient in a chair, the surgeon standing beside him and placing his knee in the axilla, while he bends the arm over it: or the back of the chair, well padded, may be used as the fulcrum, and the head of the bone raised into its place by using the humerus as a lever.

The *second* method of treatment is by drawing the arm upward. The patient is laid flat on his back, the shoulder is fixed by the hand of the operator, or by a jack-towel thrown around it, the arm raised by the side of the head, and traction made, either by manual or mechanical force, until the head of the bone is lifted into its socket.

After reduction, a pad should be placed in the axilla, the upper arm bandaged to the side, and the fore-arm carried in a sling for two or three weeks, or for a sufficient length of time to prevent the joint from (as it were) forming a habit of becoming dislocated by very slight accidents.

The other varieties of dislocation at the shoulder-joint may be reduced by extension downward; though, in each case, the direction of the extending force will have to be slightly modified to suit the particular position of the bones.

After the lapse of three months, it is almost hopeless to attempt the reduction of a dislocated shoulder. If the patient has begun to move his arm, and a false joint has been already in some measure established, the surgeon had better not interfere. The most serious and even fatal consequences may follow an injudicious attempt at reduction.

IV. — Dislocations of the Elbow.

These are commonly the result of great violence. They are, therefore, likely to be attended with much inflammation, and are often associated with fracture.

They may be considered under three heads: 1. Dislocation of both bones; 2. Those of the ulna alone; 3. Those of the radius alone.

1. Both bones may be displaced either *backward* or *forward*. In the former case, the coronoid process is very likely to be

broken; and, in the latter, the olecranon. In both cases the diagnosis must be established by a careful comparison of the relative situation of the bony points in the two arms. If there is much swelling, it is often extremely difficult to determine accurately the nature of the injury.

2. The ulna may be dislocated *backward*. When this happens the point of the olecranon projects unnaturally, and there is a hollow above it. The elbow is fixed at a right angle. That the radius is not implicated may be ascertained by pronation and supination. Here, too, the coronoid process is very liable to be broken.

3. The only dislocation of the radius which we need mention is the dislocation *forward* on to the external condyle, though it is occasionally dislocated backward, and sometimes outward.

Reduction.—If the ulna is dislocated, with fracture of either of its processes, it will be easy, by extension or by flexion, to restore the bones to their proper position, though it may be very difficult to keep them *in situ*. But, if the ulna is dislocated without fracture, reduction will be a more difficult matter. It

Fig. 152.



may, however, be effected by bending the elbow across the surgeon's knee, which he uses as a fulcrum. In the dislocation of the radius, the arm should be extended, while the head of the bone is pressed down into its place.

[Both bones may be dislocated inward or outward. The former condition is very rare, and reduction is exceedingly difficult, if not impossible. Both these dislocations, as a rule, are incomplete; but exceptions have been found in the case of the external variety.]

Reduction should be accomplished by making extension while the arm is at a right angle, and making lateral pressure in either direction, according to the dislocation.]

After reduction, the arm should be fixed upon an angular splint, and carried in a sling.

V.—Dislocation of the Wrist.

This is extremely rare. It must be carefully distinguished from fracture of the lower end of the radius (Colles's). The *treatment* consists in extending the joint, and then applying a flat splint.

VI.—Dislocations of the Hand.

The metacarpal bone of the thumb, and the phalanges of the thumb or of the fingers, are sometimes dislocated. These accidents are, however, rare, owing to the strength of the lateral ligaments.

The *treatment* consists in making extension by means of a tape, or narrow bandage, fastened to the finger by the "clove-hitch," and then securing the finger upon a splint. In some cases it has been found necessary to divide the lateral ligaments subcutaneously before reduction could be effected. Levis's splint will greatly facilitate reduction. (Fig. 153.)

Fig. 153.



VII.—Dislocations of the Hip.

Dislocations of the hip are four in number:

1. Dislocation backward and upward, on to the dorsum ilii.
2. Dislocation backward and downward, into the sciatic notch.

3. Dislocation forward and upward, on to the pubes.
4. Dislocation forward and downward, into the obturator foramen.

1. Dislocation Backward and Upward, on to the Dorsum Ilii.—This is the most common of all. The head of the femur rests on the smooth surface immediately above and behind the acetabulum. In this situation it forms a prominence which may be felt, especially on rotating the limb. There is loss of power, and distinct shortening. The thigh is slightly flexed on the pelvis, and the leg on the thigh. The knee points toward its fellow of the opposite side, and the foot is turned inward, the toe resting on the opposite instep.

Reduction.—The patient should be anæsthetized, and laid on his back on a mattress, placed on the floor. The pelvis should be fixed by means of a jack-towel, passed under the perinæum, and fastened to a staple in the floor. A belt should be attached to the lower part of the femur, and connected with the pulleys. The extending force should then be applied slowly and gradually in the direction of the axis of the limb, until the resistance of the muscles is overcome. At the same time, the leg should be rotated outward, or manipulated in such a way as shall facilitate the object in view. In some cases it may be necessary to pass another towel between the thighs, so as to abduct the upper part of the femur, and lift the head of the bone over the edge of the acetabulum.

After reduction, the patient should be confined to bed for a fortnight; a long splint should be applied to his leg in the usual way, and secured by an additional bandage round the hips, and the lotion of Arnica applied.

After eight weeks have elapsed, it is almost hopeless to attempt the reduction of a dislocated hip.

2. Dislocation Backward and Downward into the Sciatic Notch.—This presents much the same signs as the first form of dislocation; only they are not so well marked, because the head of the bone drops into the sciatic notch, instead of resting on the dorsum ilii. The direction of the limb, too, in this dislocation, is more oblique than in the former; the affected thigh points across the middle of the opposite one. The mode of reduction does not differ materially. The toe rests upon the great toe of the opposite foot.

3. Dislocation Forward and Upward, on to the Pubes.—Here the prominence of the trochanter is gone; the limb is shortened and abducted; the toes point outward, and the head of the bone can be distinctly felt above Poupart's ligament.

Reduction.—The pelvis should be fixed by a perineal band, and then extension should be made downward and backward. Here, again, as in the first case, reduction may be facilitated by passing a towel round the upper part of the thigh, and lifting the head of the bone over the edge of the acetabulum.

4. Dislocation Forward and Downward, into the Obturator Foramen.—This is marked by lengthening. The leg is abducted. The toes point forward, and sometimes a little outward. The trunk is bent forward, by the tension upon the psoas and iliacus muscles. The prominence of the trochanter is lost. The head of the bone may be felt in its new situation.

Reduction.—The pelvis is to be fixed by a belt passed round it, and secured by a staple on the opposite side of the trunk. The upper end of the femur is then to be abducted, by means of a towel passed round it, and connected with the pulleys. In this way, the bone is drawn directly outward, until it reaches a point where the muscles are able to act upon it, and restore it to its place. At the same time, the knee should be adducted, drawn toward the mesial line, so as to use the femur as a lever, and help in raising the head of the thigh bone.

VIII. — Dislocation of the Patella.

Dislocation Outward.—The patella is sometimes dislocated outward, on to the outer side of the external condyle.

This accident is apt to occur from muscular violence in persons who are knock-kneed.

Signs.—The knee is extended, or slightly bent. A depression may be felt in the front of the joint, while the patella can be detected in its new situation.

Treatment.—The treatment consists in relaxing the extensor muscles by flexing the thigh on the pelvis and raising the leg. Then, by means of a little manipulation, the bone may be restored to its proper place. After reduction, the patient should wear a bandage, or an elastic knee-cap, for a few weeks.

Dislocation Inward.—Occasionally the patella is displaced inward; and, in some rare instances, it is turned half round, so

that its outer edge points forward, and presents a sharp ridge under the skin. Mr. Bellamy has lately recorded a case of this kind. A young man, in jumping out of a cart, caught his foot on the rail and fell. There was great deformity at the knee. The patella was dislocated on to its inner edge, with the articular surface turned outward. By extreme extension under Chloroform, it was soon reduced; but synovitis followed. Ultimately, the patient perfectly recovered.

IX. — Dislocation of the Semilunar Cartilages.

Dislocation of these cartilages sometimes occurs in consequence of a sudden and violent wrench. If the cartilage is compressed between the tibia and the femur, it gives rise to intense pain, and the patient is unable to stand, or to move his knee.

The *treatment* is unsatisfactory, and the case must often be left to nature. By rotating the tibia on its axis, the surgeon may sometimes succeed in restoring the parts to their proper positions.

X. — Dislocations of the Knee-Joint.

Dislocations of the knee-joint are the result of great violence, and are more often compound, or complicated, than simple. Nevertheless, the tibia may be displaced *backward* or *forward*, or to *either side*. These dislocations are generally incomplete, and accompanied by more or less rotation.

Reduction is made by flexing the thigh, fixing it in that position, and then making extension by drawing from the ankle. When this is done, and a little pressure used, the bones may, in most cases, be restored to their proper situations without difficulty.

Not unfrequently the knee-joint is dislocated by disease (pathologic.) In these cases, the tibia is generally drawn backward and upward.

XI. — Dislocation of the Ankle.

This consists in the separation of the astragalus, carrying with it the foot, from the bones of the leg. These injuries can hardly occur without fracture of one or both malleoli.

The foot may be displaced *backward* or *forward*, or to *either side*. The dislocation outward, with fracture of the external malleolus, is the most common.

In all cases, *reduction* must be effected by drawing upon the foot until the bones are brought into their positions, and then fixing them by means of side splints, or a McIntyre's splint, as the case may require.

XII. — Dislocation of the Astragalus.

Dislocation of the astragalus may take place either *forward* or *backward*. Of these displacements, the former is the most common. The accident generally happens from the patient falling upon his foot, when it is in the extended position. The bone may usually be felt, either on the instep, or in the space between the tibia and the tendo Achillis.

Reduction may sometimes be effected by simply drawing upon the foot. Sometimes division of the tendo Achillis may be necessary.

Not unfrequently, it will be found impossible, after all, to bring the bone back to its place. In such a case, it may either be excised at once, or left to itself. If left to itself, it is most probable that the skin over it will slough, and then part of it may be removed with the saw or pliers, or else allowed to exfoliate.

Mr. Hancock has recently reported a case in which an excellent result was obtained by removing the bone at once, and treating the wound with a constant stream of Carbolic acid lotion from a syphon bottle.

But, in truth, the dislocations of the ankle and of the astragalus are much more often compound or complicated than simple. If bony points protrude through the skin, and cannot be reduced, they must be sawn off, as in the case of compound fractures. If the soft parts are extensively lacerated, or if the main vessels are torn, or if the age and habits of the patient are unfavorable, the case will probably require amputation.

Some authors speak of the leg as being dislocated from the foot. Strictly speaking, this is correct; for, in the accidents which lead to dislocation of the ankle or of the astragalus, the foot is the fixed point, and the leg is wrenched from it by the weight of the body. But it is more convenient to have one general rule applicable to the whole body, and to say that the distal part is dislocated from the proximal.

PART III.

Venereal and Sexual Diseases.

CHAPTER I.

A Condensed History of Venereal Diseases.

THERE are three forms of venereal diseases; viz., *gonorrhœa*, chancroid, and syphilis, or chancre. The first two possess immemorial antiquity, having been described in Chinese systems of medicine nearly 4,500 years ago. In the Hindoo, Greek, Arabic, and Latin literature, descriptions of these diseases date back to the remotest periods of time; and recent syphilographers refer the origin of syphilis to the earliest history of the preceding, though the identification with the present disease is not so fully established. During the middle ages, a peculiar eruptive disorder, termed *lepra*, was found to be communicated by sexual intercourse, in connection with certain venereal derangements. These are supposed by modern writers to correspond to the tertiary forms of syphilis, as at present known. It spread from person to person during sexual intercourse, was contagious, and maintained certain and uniform characters wherever observed. During the early periods it was known as the "great pox," in contradistinction to another type of disease of a very different origin and development. It was supposed by some, that Columbus brought it from America with his fleet, and from this nucleus it spread like a plague through all Europe. It is well known, that syphilis was not recognized as a morbid unity until the end of the fifteenth century, at or about the period of the siege of Naples, 1494, during the reign of Charles VIII. It was then called the *mal de Naples*. About the middle of the sixteenth century, all venereal disorders were attributed to the same origin. Previous to this, a line of distinction was observed and insisted on between gonorrhœa and chancroid and syphilis; and up to the present

century, there was no classified distinction between these diseases. Amid all this confusion and want of formulation, we see diseases entirely dissimilar from syphilis, classified under the syphilitic form, and vice versa. Hence, the diseases were called, at different times, *yaws*, in the West Indies; *sibbens*, in Scotland; *radezyge*, in Norway; *schierlievo*, in Dalmatia; and by other names in different parts of the world; and they were not supposed to possess a truly venereal origin, until they were undoubtedly proven to be only varieties of the one disease, syphilis.

Throughout all these conditions and variations, the fact is patent, that syphilis has changed to a considerable extent; that the characteristics that designated it in the past are different from the features that envelop it in the present. It has lost some of its more virulent and destructive properties: its genius is the same; but its sting has lost its malignancy. Thus, we are led to infer that the syphilis of the older writers is not the syphilis of modern observers. "In a majority of cases," says a distinguished author,* "the type of the disease, as encountered at the present day, is mild. It can be controlled, to a great extent, by treatment. Thousands of individuals pass through it, unharmed in tissue, in feature, in function, to reach a green old age, and die of natural causes, leaving behind them healthy offspring, who know not the sins of their fathers." How different are these truly scientific and recently formed views, from those of certain of our own syphilographers, who, at this present writing, aver, that, "of all the ills to which flesh is heir, there are none that can be compared to this, in malignancy, inveteracy, and profound vital disturbance." If this doleful sentence had been written away back in the darkness of our past knowledge of this disease, as it then appeared, carrying fear and dismay to all who fell under its baneful influence, rather than at the present time of our advanced status of medical science, touching this disorder, it would fall far less harshly upon the ears of the advanced student of our own time.

* Keys on "Venereal Diseases," p. 55.

CHAPTER II.

Gonorrhœa and Other Diseases.

SECTION I.

Gonorrhœa and Urethritis.

GONORRHŒA is the term applied to a specific inflammation of the urethra or vagina; the result of impure sexual intercourse, and accompanied by a purulent discharge. After exposure to infection, an uncertain period elapses before the symptoms are developed, called the *period of incubation*, which lasts from four to seven days. The disease is divided into three stages, each having distinctive peculiarities; viz., *accession*, *acute inflammation*, and *decline*.

First Stage (Accession).—In the male, the disease comes on with gentle heat and irritation; a sense of tickling or slight itching within the meatus. The glans becomes congested; the lining membrane is red, swollen, and the orifice partly closed; and there is emitted a thin, whitish watery discharge; while the urine is passed with difficulty, and the stream is diminished, twisted, and forked. Accompanying these symptoms, there is a dull, aching pain in the back, loins, and testicles, with more or less pyrexia.

Second Stage (Acute Inflammation).—In this stage all the symptoms are aggravated; the discharge becomes thick, puriform, and perhaps of a greenish or reddish tinge, with prolonged and painful erections at night; pain and scalding in passing urine, which is more frequent. The penis is often curved as if tied down with a string (*chordee*), which is due to deposit of lymph in the corpus spongiosum, which interferes with the uniform expansion of the organ, and is exquisitely painful. At times the prepuce is œdematous, which may give rise to phimosis or paraphimosis. Abscess may form in the substance of the penis, causing much pain and trouble; or a metastasis may take place to the testicle, producing orchitis. The lymphatic glands

in the groin may become inflamed and suppurate (bubo); or, at the termination of this stage, there may occur rheumatic pains of an exceedingly obstinate kind, in the larger joints (gonorrhœal rheumatism).

Third Stage (Decline).—When the inflammation has run its course and is on the decline, there follows a thin, muco-purulent discharge (gleet), which may continue for some time, and become very inimical to treatment (incipient stricture).

Urethritis, or Blennorrhagia.—There is a form of disease resembling gonorrhœa, but which is not produced by a specific virus. This disease may be caused by external violence, the use of instruments, masturbation, excessive coitus, and by accidental causes; each case wanting the direct contagion. This disease is less violent than the preceding, cannot be generated by auto-inoculation, and is more amenable to treatment than gonorrhœa. Great caution should be exercised in discriminating between these diseases; and, when in doubt, inoculation should be performed, and a correct diagnosis arrived at. A preponderance of cases of urethral inflammation are of this type of disease, and are produced by the causes assigned. As a rule, the *first* attack of urethral inflammation is more *violent* than subsequent attacks.

Treatment.—The treatment is both *prophylactic* and *curative*. The difficulty in employing the first is that the physician does not see the patient till too late to use the abortive treatment, which should only be done in the "accession" period. This is accomplished by injecting into the urethra, *never beyond the inflammatory portion*, which is about the fossa navicularis, a weak solution of *Nitrate of Silver*, *Sulphate of Zinc*, or *Cuprum*; one grain of the *Nitrate* in three ounces of distilled water, or three grains of either *Zinc* or *Cuprum* in the same amount of water, and add six grains of *Gum Arabic* to each mixture.

The following recipes are highly recommended as prophylactic agents, and should be used warm:

- R. Merc. corros. ϕ gr. i.; Aqua Rosæ, \mathfrak{z} viii.
- R. Nitric acid, ϕ gtt. iii. to vi.; Aqua bull., \mathfrak{z} viii.
- R. Nux vomica, ϕ gtt. xx.; Aqua Rosæ, \mathfrak{z} iv.
- R. Cannabis sat., ϕ gtt. xii.; Aqua bull., \mathfrak{z} vi.
- R. Eryngium aquat., ϕ gtt. xii.; Aqua bull., \mathfrak{z} viii.
- R. Geisemium, ϕ gtt. xii.; Aqua bull., \mathfrak{z} viii.

This should be employed with rigid regularity every four hours, till all the primary inflammation is destroyed. The patient should void urine just previous to the injection, or the urethra be washed with warm water. If the injection of Silver (my favorite remedy) passes away loaded with a pearly looking discharge, it must be repeated till it comes away unmixed with any of this peculiar product. After each injection, the discharge will be increased for an hour or two, when it becomes gradually thinner and less copious. Two or three days are ample for a perfect cure if strict attention is given to the details of the operation, hygienic treatment, etc. Injections should never be employed stronger than the above, and never during the inflammatory stage.

The medical treatment consists in the use of the following remedies: *Sepia* in the *accession* stage; *Acon.*, *Gels.*, and *Merc.* in the *inflammatory* period; to be followed by *Can. sat.*, *Merc. sol.* and *cor.*, *Canth.*, *Copaib.*, *Santal.*, *Petros.*, *Caps.*, *Sepia.*, *Ereth.*, *Erig.*, *Eucalypt.*, *Agnus cast.*

SPECIAL INDICATIONS.

Sepia.—This remedy, given in the higher potencies, is one of our most valuable agents for the cure of urethritis in the stage of accession; and I have made numberless cures with it. It corresponds faithfully to the *tingling*, *smarting*, and *titillation*, itching of the prepuce, and discharge of milky fluid; and, whenever I could hold my patient well in hand, I have rarely required any other remedy. It corresponds with the urging, frequent and painful micturition, mucous discharge, smarting, tenesmus, and bearing-down sensation about the perineum.

Gelsemium.—This is a precious remedy in all cases of urethritis and gonorrhœa when the symptoms are sub-acute; discharge moderate; frequent irritation, with considerable heat and little pain, with smarting and redness at the meatus. In sub-acute cases, or in severe cases when the inflammatory symptoms have been subdued by previous treatment.

Aconite.—In acute gonorrhœa, inflammation well developed, even scalding, copious, thick greenish discharge; frequent and painful erections, with more or less febrile disturbance; lips of the meatus red and swollen. After inflammatory symptoms have subsided, give *Can. sat.* for smarting pain, burning and stinging during micturition, ardor urinæ, constant urging, titillation, copious, thinner, yellow or whitish discharge; the lips of the meatus glued together, and retaining the matter within; prepuce swollen and painful, with burning, smarting, stitching, darting pain in the urethra, extending from the orifice of the penis to the bladder; strangury, with pains extending to the scrotum, with dragging of the testicles.

Mercurius Corrosivus.—Another valuable agent in the acute stage, with thick green and bloody discharge, painful erections, swollen prepuce, constant desire to urinate; muco-purulent matter mixed with blood; cutting

pains in the urethra ; swelling and burning of the prepuce ; lips of the meatus red and œdematous ; drawing pains in the testicles, with swelling of the glands ; chordee ; stream of urine smaller, and passes away feebly. *Mercurius solubilis* acts well in cachectic and impaired constitutions ; in sub-acute cases, especially after *Aconite* ; discharge slight ; itching and stinging pains, mostly confined to the glans.

Copaiba. — When the inflammatory symptoms have been mitigated by *Aconite*, or previous treatment ; or in sub-acute cases, with itching, smarting, and burning in the urethra, with nocturnal chordee ; urine emitted in drops ; swelling and redness of the urethra ; urging pressure ; pulsative pains along the urethra ; the urine has the odor of violets, with a constant desire for its voidance ; discharge yellow and copious, the urine depositing a sediment resembling albumen. A peculiar *erythema*, with sub-acute synovitis, has frequently occurred in my practice from its use in the crude form.

Oleum Sandalum. — This remedy has of late done me good service in the cure of this often intractable disorder, after the use of *Aconite* for twenty-four or thirty-six hours, when the discharge is thick, yellowish, or muco-purulent, attended with burning, smarting pain ; frequent desire to urinate ; swelling and redness of the meatus, with smarting, stinging pain in voiding urine ; painful erections ; swelling of the prepuce as if distended with water. I have used it in the first and second potencies with the most satisfactory results. I prefer the latter. After amelioration by the second, the third acts even more satisfactorily.

Petroselinum. — Another new remedy ; and, like the former, most appropriate when the more violent symptoms have been controlled by *Aconite* or other appropriate treatment. Especially in cases where the inflammation has passed up the urethra, rapidly involving the base of the bladder, with distressing ardor urinæ, with strangury ; discharge profuse, thick, and whitish. (See *Cantharides* and *Capsicum*.)

Cantharides. — Cutting, stinging pain during and after micturition ; discharge thick and yellow, with severe pains at base of bladder, continuing before and after urinating, with ardor urinæ. (Consult *Capsicum*.)

Cubeba. — This is a remedy too much overlooked in those chronic, sub-acute, or gleet conditions of the genito-urinary tract ; and in the blennorrhagias that occur in relaxed or impaired constitutions, especially after frequent attacks of urethritis, with an absence of the more violent symptoms.

Mezereum. — In mild cases, with stinging, titillating pains, beginning at the bladder, and extending to the meatus ; discharge thin and yellowish ; soreness along the urethra after voiding the urine, which is acrid and red, like blood.

Terebinth. — In sub-acute and chronic blennorrhœa, with burning during urination ; suppression of urine ; urethra sore, discharge whitish ; unsuccessful attempts at micturition ; irritation extending from the bladder to the meatus.

Kali Hydriodicum. — In chronic urethritis of long standing, with constant urging to urinate, with thick, green mucous discharge ; pain during micturition ; irritable and sensitive urethra.

Erigeron Canadensis.—In chronic blennorrhœas, with irritation of the urethra, and increase of offensive urine; drawing pain in the back, running down to right testicle.

Stillingia has been given in chordee with painful erections, burning and itching during the act of micturition; irritation extending to the bladder.

Thuja.—In chronic and ill-treated cases, with burning in the urethra; stitching pain at the meatus, between the acts of micturition; sensation of titillation, as if a drop of urine was passing along the urethra.

Sulphur.—In chronic gonorrhœa, when the discharge is slight, but the smarting and burning continue during urination; urine passes in a thin stream; walls of the urethra thickened; itching along the urethra, with constant desire to void the urine; pain, stinging, and tearing, between the acts of micturition, when the appropriate remedy seems to have lost its curative action.

Dr. Price, of Baltimore, advises, as soon as the *first* drop appears, to inject a few drops of clear Glycerine, enough to fill the urethra as far back as the inflammation extends; hold it there for five minutes, then let it escape; urinate before using. Another plan is to wrap a piece of raw cotton around Emmett's silver probe, saturated with Glycerine; pass it into the urethra an inch or more; repeat if necessary. These prophylactic measures may be tried, I think, with fair success.

My experience has led me, after many years of practice, and large numbers of patients treated, to resort to the medium potencies, when the best-directed efforts with the crude and lower attenuations effected little or no good. A resort to the middle and higher potencies, as high as the thirtieth, has almost always resulted in marked improvement and speedy cures. I can confidently recommend their employment when both physician and patient are wandering about in the maze of unrelief.

During treatment, the patient must abstain from all stimulants, condiments, strong coffee and tea, and tobacco in every form; quiet and rest should be enjoined, and the strictest cleanliness be observed. In such cases, when a "drop or two" still appears after a well-conducted course of treatment, suspect incipient stricture, and use mechanical dilatation. Some authors speak of a kind of inflammation of this character, which they term "gonorrhœa sicca," or dry clap. I do not attach any importance to this as a variety of gonorrhœa. Use suspensory bandage to the scrotum if the patient will attend to business. Sexual excitement should not be permitted, and all hygienic precautions enforced during treatment, and two weeks after, for fear of a relapse.

SECTION II.

Orchitis, Balanitis, Cystitis, and Ischuria.**I. — Orchitis.**

Orchitis is an inflammation of the testis proper. When the epididymis is involved, it is termed *epididymitis*. In a badly managed gonorrhœa, both structures may be involved; especially so, after exposure to cold, or strong caustic injections. When it occurs coincident with gonorrhœa, there is a temporary cessation of the discharge; the disease, by metastasis, attacking the testicle. The symptoms are, weight and tenderness in the perinæum; pain in the back and loins, extending from the scrotum; testicle swollen; skin covering scrotum tense, dark red or purplish; tenderness to touch; with fever; furred tongue; dry skin. This may terminate in abscess, with an increase of all of the above symptoms, with a feeling of pulsation and pain deep in the organ; shiverings are present, and even the pressure of the bedclothes is insupportable. The pus is mostly ill conditioned; fluctuation is felt; and, if left alone, the abscess will be discharged by several openings, and a peculiar *fungous growth* spring forth from these outlets.

Treatment.—Remedies act exceedingly prompt in this affection. In mild cases a few doses of *Sulphur* will restore the urethral discharge, and allay all inflammatory trouble connected with the testicle. In plethoric persons, *Aconite* and *Belladonna* are very serviceable. *Gels.*, *Puls.*, *Phytol.*, *Clem.*, *Ham.*, *Merc.*, *Rhod.*, *Ant. tart.*, *Verat. vir.*, *Spong.*, *Hep.*, will be found competent to cure the worst cases. After inflammation has passed, use adhesive straps and the suspensory bandage. (Fig. 154.)

Fig. 154.

**SPECIAL INDICATIONS.**

Aconite.—If there is fever, hot and dry skin, full pulse, and other active indications of vascular excitement.

Gelsemium.—When the disease arises from suppressed gonorrhœal discharge; from exposure to cold or wet weather, or when biliary disorders exist, with tendency to congestion.

Clematis Erecta. — After activity of the inflammatory conditions has subsided. If the disease began in the epididymis ; or if it assumes a chronic type, with induration and sensitive prepuce ; retraction of the testicles and cord ; coming on after exposure to cold. (See Aurum.)

Belladonna. — If the organ is hot and swollen ; in plethoric persons, with tendency to delirium, and congestion to the head.

Pulsatilla. — Is serviceable in persons of mild disposition, easily affected to tears ; delicate organizations. When the inflammation is sub-acute, the glands alone being affected, pain shooting down the back, or into the thigh, and changing suddenly, with little or no thirst during the fever.

Hamamelis. — Dull, heavy pain in the testicle, at times excruciating ; unconscious seminal losses ; scrotum hot, congested, and swollen, the covering having lost its corrugated appearance, and becoming tense, smooth, and shining. (See Belladonna.)

Hepar Sulph. — For abscess of the testicle fully formed ; after pus is formed, evacuate with bistoury or aspirator ; close wound with a piece of adhesive plaster. *Silicea* and *Phosphorus* may be required to complete the cure.

Mercurius. — After subsidence of inflammation, and the formation of pus threatens, with shivering and profuse perspiration ; the gland hard and sensitive. If testicle continues hard, *Iodium*. The scrotum should be well supported on a small pillow placed between the thighs. Apply locally, *Acon.*, *Bell.*, *Clemat.*, *Puls.*, or *Ham.* lotions to scrotum ; low diet, and rest in the recumbent position ; strapping of the testicle.

In rheumatic orchitis, *Acon.*, *Gels.*, *Bell.*, and *Merc.*, in the lower attenuations, have done good service in my hands.

II. — Balanitis.

Balanitis, or spurious gonorrhœa, is caused by impure coitus, or a want of cleanliness about the glans penis, and is accompanied with itching, burning, and soreness under the prepuce ; increased by walking. The inflammation may be very severe, with œdema of the prepuce and phimosis, and become very distressing, yielding a muco-purulent discharge. It frequently arises from the sebaceous glands around the corona, which secrete a cheesy kind of matter ; this, becoming disorganized, produces an inflammation which envelops the lining membrane of the glans, and gives rise to excoriation and swelling of the prepuce.

It is called *posthitis* when the inflammation extends to the lining membrane of the prepuce.

The *causes* are, want of cleanliness, leucorrhœa, menstrual secretions, violent coition, as well as contagion.

Treatment is cleanliness and lotions of *Hydrastis* or *Calendula*.

If the swelling of the prepuce is so tense as to prevent preputial retraction over the glans, cleanse with a small syringe, its nozzle being introduced within the aperture of the prepuce, and the lotion applied three or four times a day. When the prepuce can be retracted, apply *Calendula* or *Hydrastis* cerate to the part, or sprinkle the abraded surface with *Mercurius dulcis*, first trituration. If phimosis occurs, treat as advised under that affection. *Aconite*, *Corallium*, *Mercurius*, *Nitric acid*, or *Pulsatilla* may be required internally. A quantity of yellowish humor behind the corona may indicate *Lycopodium*; humid, soft excrescences behind the corona, which itch on being rubbed, *Staphysagria*.

III. — Cystitis.

Cystitis may arise spontaneously from neglected gonorrhœa, or from metastasis, caused by violent abortive measures; the unskillful use of instruments, cold, hæmorrhoids, and injuries.

Symptoms.—Pain in the supra-pubic region, extending to the sacrum, the perinæum, and along the urethra. Tenderness on deep pressure over the pubes; frequent micturition with pain and difficulty, the symptoms being aggravated rather than relieved when the bladder is emptied; a tumor in the region of the bladder, with pains of a burning, lancinating, or throbbing kind; pulse frequent; skin hot and dry; tongue furred and whitish. If the neck of the bladder is affected, pain is mostly felt in the perinæum, and there is entire or partial retention of urine, with dysuria or strangury. The introduction of a bougie is exceedingly painful. If the posterior part of the bladder is chiefly affected, violent tenesmus will be felt, from its contiguity to the rectum. It sometimes terminates in abscess, or complete suppression, which is a serious complication.

Treatment.—The principal remedies are, *Acon.*, *Apis*, *Aloes*, *Bell.*, *Canth.*, *Chimaph.*, *Dulc.*, *Dig.*, *Erig.*, *Chin.*, *Can. sat.*, *Eup. purp.*, *Sant.*, *Hydrast.*, *Kali iod.*, *Puls.*, *Terebinth.*, *Uva ursi*, *Squill.*, and *Sulph.* Injections of warm *Hydrastis* lotions thrown into the bladder. Hot fomentations, and sitz baths, locally, are very beneficial. A high degree of inflammation, with suppression, is very serious. It may terminate in resolution, suppuration, induration of its wall, or gangrene. In resolution, there is a gradual decline of symptoms. In suppuration, chills or rigors occur, with white matter in the urine. Induration is known by

subsequent irritation, gangrene, coldness, prostration, weak pulse, hiccough, and pallor.

SPECIAL INDICATIONS.

Aconite. — Excessive and fruitless desire to urinate, with the emission of a few drops of red, deep-colored urine; violent fever and thirst; pains increased on making water; great tenderness in the supra-pubic region. In rheumatic cystitis it is invaluable.

Cantharides. — Shooting and burning pains in the vesical region, both before and after emission, a few drops of bloody urine passing at a time; cutting pains from the loins to the bladder; ardor urinæ; bloody urine, with cutting, burning pains in the perinæum.

Colocynth. — Tenesmus; pains at urination felt over the whole abdomen; urine light-colored, depositing a tenacious sediment; after inflammatory symptoms have subsided, and mucus is discharging. In induration of the bladder walls after inflammation. (See Merc. sol.)

Cannabis. — Complete retention; great desire to pass urine; a few drops of bloody urine is passed, with burning pain.

Digitalis. — The neck of the bladder principally affected; constrictive pain in the bladder, with retention; urine turbid or deep-colored, and passed in drops.

Kali Carb. — Great desire to urinate, with scanty emission; great pressure before urinating; hot, scanty urine; frequent painful emissions of small quantities, desire continuing after emission.

Phosphorus. — Inability to retain urine long; constant desire for its evacuation, and at the same time a movement of the bowels; profuse urination; dull pain in the hypogastrium prevents micturition; paralysis of the bladder, — chronic cases.

Squilla. — Great desire to pass urine; emission scanty; urine hot and red, with sticking pains in the fundus of the bladder, producing movements of the bowels (Phos.).

Sulphur. — Urine mixed with mucus or blood; burning during urination.

Nux Vomica. — When hæmorrhoids are present. In chronic catarrh of the bladder. *Acid phos.*, *Lyc.*, *Caust.*, *Copaiva*, *Carbo veg.* when paralysis sets in; *Ars.* and *Lach.* for gangrene. The diet should be regulated; avoid animal food, spices, wine. Carbonated water has a good effect.

IV. — Ischuria.

Retention of urine differs from suppression. In the latter, the kidneys do not perform their accustomed functions. In ischuria, more or less pain exists in the bladder, which is distended, and can be felt, in some cases, above the pubes. There is urgent desire to urinate, with pain and sickness, and a very small quantity is emitted. The disease, as a rule, yields readily to remedies. If the bladder is over-distended, and a species of paralysis has

set in, *Aconite*, *Hellebore*, *Nux vomica*, and *Dulcamara* are important remedies. *Opium*, if the difficulty is purely nervous. If there are stabbing pains in the urethra, with feeling of stiffness, worse at night, *Digitalis*; *Apis*, if complete suppression exists; *Buchu* relieves spasmodic retention. The following remedies may be consulted in particular cases: *Aconite*, *Cannabis*, *Cantharides*, *Pulsatilla*, and *Stramonium*.

If the symptoms are urgent, and remedies have not had the desired effect, warm baths are beneficial; Electro-Galvanism, and finally the catheter, if the patient is suffering from over-distention. In cases of stricture or paralysis, if it is found impossible to relieve the bladder by these means, recourse must be had to puncture of the over-distended viscus, either by aspiration or puncture with a trocar.

SECTION III.

Special Indications for Diseases of the Bladder and Urethra.

Aconite. — This great antiphlogistic is indicated when the skin is dry and hot; great thirst; unrest: nervous excitement; fear and anxiety; pain in the region of the bladder; retention of urine, with stitches in the kidneys; frequent and violent urging to urinate, with scanty emissions of red, turbid urine.

Angustura. — Tenesmus of the bladder, followed by profuse emission of white urine; tenesmus after micturition. One is obliged frequently to urinate, although but a few dark yellow drops are emitted each time, causing a burning pain; orange-colored urine, soon becoming turbid.

Anatherum. — Frequent emission of urine, which is turbid, or soon becoming so; sensation of numbness and obstruction in the kidneys; sensation as if the kidneys and bladder were always full and swollen. Pressure and burning pains in the bladder, with urging to urinate every minute; the bladder cannot hold the smallest quantity of urine. Difficult, painful, intermittent urination: it stops, and begins again the next moment. Fullness and distention of the bladder, with inability to urinate, urine turbid, thick, and full of mucus, as in catarrh of the bladder; retention of urine, with retraction of the urethral canal; urine brownish or yellowish, and bloody; very frequent urging to urinate, with burning urine, which is discharged in drops; urine with yellowish, grayish, or dark sediment; incontinence of urine, with involuntary urination when walking, and even at night in bed during sleep, as if caused by paralysis of neck of bladder; tenesmus vesicae, with ischuria.

Apis. — Burning in the urethra before and after micturition; disagreeable sensation in the bladder, with a bearing-down in the region of the sphincter, and frequent desire to urinate; incontinence of urine, with great irritation of

the parts; worse at night and when coughing; almost incessant desire to pass urine; urine high-colored, and more frequent emissions of small quantities; straw-colored urine, with brickdust sediment.

Asparagus. — Urging to urinate; burning in the urethra; frequent urinating, with fine stitches in the orifice of the urethra; urine scanty and cloudy; a little straw-colored urine is passed, which becomes turbid immediately after being passed, and is full of motes; after urinating, burning in the urethra, with sensation as if there was some urine to pass.

Arnica. — This remedy will often be indicated in affections of the bladder arising from mechanical injury, when retention of urine is present, with tenesmus of the neck of the bladder, with ineffectual efforts to urinate; urging, the urine dropping out involuntarily; brown urine, with brick-red sediment; one has to stand a great while before the urine is emitted; urine strongly acid; specific gravity increased.

Arsenicum Album. — Retention of urine, as if the bladder was paralyzed; scanty urine, passing with difficulty; burning in the urethra during micturition, tenesmus and strangury; great desire to urinate, but does not pass any urine: urinates more frequently than usual. Involuntary emission of urine in the night when sleeping; ischuria; urine copious and burning hot. Greenish, dark brown urine, turbid when emitting it: urine profuse and dark brown; hæmaturia; much sediment in the urine.

Belladonna. — Difficult micturition, the urine being passed guttatim, with frequent urging; the urine is yellow and turbid, sometimes depositing a reddish sediment; constant dribbling of urine; sharp stitches low down in the abdomen in the direction of the perinæum; pains come on suddenly, and cease in the same way; feeling in the back as if it would break; enuresis, with profuse perspiration; paralysis of the sphincter vesicæ.

Berberis Vulg. — Violent stitching pains in the bladder, extending from the kidneys into the urethra, with urging to urinate; frequently recurring crampy pain in the bladder; cutting, constrictive pain in the bladder, when full or empty; burning in the urethra; burning pain in the female urethra during and after micturition; stitching pain in the female urethra, beginning in the bladder; violent stitches in the bladder, which compel one to urinate; burning pain in the bladder. Urine dark yellow, red, becoming turbid; copious mucous sediment, mixed with a whitish gray, and later a reddish, mealy sediment. Greenish urine, depositing mucus. Blood-red urine, which soon becomes turbid, and deposits a thick mucus and bright red mealy sediment, slowly becoming clear, but retaining its blood-red color; pains in the loins and kidneys frequently accompanying the morbid urine, but not always; movement brings on or increases the urinary troubles.

Benzole Acid. — Vesical catarrh; irritability of the bladder: nocturnal enuresis in children; too frequent desire to evacuate the bladder: the urine normal in appearance; decrease of the quantity of urine; urine aromatic; urine of a very repulsive color, of a changeable color, brownish, cloudy, of an alkaline reaction; dark, reddish-brown urine, of greater specific gravity than normal urine, with an acid reaction. Indicated when the urine contains

an excess of uric acid. The patient is pale, languid, with a feeling of weakness in the loins. Fleeting pains in the region of the bladder; a granular mucus mixed with phosphates in the sediment of the urine.

Calcarea Carb. — Pain in the bladder, and cutting on urinating; burning in the urethra before and after urinating; fine tickling stitches through the urethra; much sour-smelling urine passed at night; trickling of urine after micturition; involuntary passage of urine on every motion during menstruation; nocturnal enuresis; urine very dark-colored, without sediment; the urine has a pungent odor, is clear and pale; offensive, dark brown urine, with a whitish sediment; the urine soon becomes turbid, and deposits a whitish, flaky sediment; a fatty pellicle forms on the surface.

Camphora. — Diminished power of the bladder. Retention of urine, with urging to urinate; tenesmus of the neck of the bladder. Painful urination; burning urine; strangury; the urine passes in a thin stream, as if the urethra were contracted; yellowish green, turbid urine, of a musty odor; brown urine; red urine; the urine on standing becomes very turbid and thick, of a whitish green color, without deposit of sediment; urine contains mucus without sediment; urine with white or red sediment; urine increased, of a dark brown color; urine profuse, colorless, frequent; urine scanty.

Cannabis Indica. — Inflammation of the bladder; burning, scalding, stinging pain before, during, and after urination; urging to urinate, with much straining; copious discharge of clear, bright-colored urine; the urine passes freely at times, then again in small quantities, with burning and biting; the urine dribbles out after the stream ceases; aching in the kidneys; thick, red urine.

Cannabis Sativa. — Enuresis; paralysis of the bladder; drawing pain in the region of the kidneys, extending into the inguinal glands, with anxious, nauseous sensation in the pit of the stomach; burning while urinating, but especially afterward; urging to urinate, with pressive pain; stitches along the urethra when not urinating; white turbid urine; urine red and turbid; urine full of fibers, as of mucus with pus.

Cantharides. — Inflammation of uropoietic organs; pains in the region of the kidneys, and urging to urinate; burning, tenesmus, and violent pains in the bladder; ardor urinæ; urine scalds, and is passed drop by drop, with extreme pain; hot, acrid, and bloody urine; urine dark colored, turbid, and scanty; urine loaded with mucus and sediment; cloudy urine, like mealy water, with white sediment.

Carbo Veg. — Pressing pain in the bladder; contraction of the urethra every morning; frequent urging to urinate; copious emissions of light yellow urine; the urine has a strong odor; dark-colored urine; dark red urine, as if it were mixed with blood; the urine deposits a red sediment.

Causticum. — Frequent, difficult, and painful micturition; involuntary emissions of urine when coughing; nocturnal enuresis; smarting pain in the urethra while urinating; light-colored urine, with flocculent sediment.

Chimaphila Umbellata. — Chronic catarrh of the bladder; scanty urine, containing a large quantity of muco-purulent sediment; urine thick, ropy, of brick color, and copious bloody sediment; dysuria; inability to pass

the urine without standing with the feet wide apart, and the body inclined forward.

Colehicum. — Ischuria ; frequent micturition, with diminished discharge of urine ; constant burning in the urinary organs, with diminished secretion ; brown, black urine ; whitish deposit in the urine.

Colocynthis. — Alternate stitches in the bladder and rectum ; itching at the orifice of the urethra, with desire to micturate ; retention of urine, with a retraction of the testicles and priapism. Urine fetid ; it soon thickens, and becomes viscid. Urine becomes turbid, with copious deposit, often like gravel.

Conium Mac. — Pressure on the bladder ; frequent micturition during the night, the urine cannot be retained ; the flow of urine suddenly stops, and continues after a short interruption ; the urine is thick, white, and turbid, or clear as water, with frequent calls to pass it ; burning sensation when urinating ; pressure in the neck of the bladder, with stitches, worse when walking, better when sitting ; burning in the urethra.

Copaivæ Balsam. — Excessive irritation of the bladder. Inflammation of the urinary organs ; swelling and dilatation of the orifice of the urethra, with pulsative pain throughout the penis. Constant, ineffectual desire to urinate ; the urine is emitted in drops ; foaming urine, greenish, turbid, with the odor of violets.

Digitalis Purpurea. — Inflammation of the neck of the bladder ; pressure on the bladder, with the sensation as if it were too full, continuing after micturition. Continual desire to urinate, only a few drops being passed at each effort ; the urine is dark brown, hot, and burning when emitted. The urine is more easily retained in the recumbent posture ; alternate emission of large and small quantities of colorless urine ; contractive pain in the bladder during micturition.

Dulcamara. — Paralysis of the bladder, with involuntary discharge of urine ; catarrh of the bladder ; thickening of the coats of the bladder ; retention of urine ; strangury ; painful micturition ; urine turbid and white ; reddish, burning urine ; mucous sediment in the urine.

Erigeron. — Vesical catarrh, with pain and irritation ; dysuria in children ; they have frequent desire, and cry when urinating ; the urine is profuse, and of a very strong odor ; the external parts are inflamed and swollen.

Gelsemium Sem. — Enuresis from paralysis of the sphincter, in children at night ; profuse urination ; urging, with scanty emission, and tenesmus of the bladder ; spasm of the bladder, with alternate dysuria and enuresis.

Graphites. — Micturition is preceded by a cutting pressing from the kidneys ; anxious pressure in the bladder, with sudden desire to urinate, but scanty emission ; nightly desire to urinate ; nocturnal enuresis ; frequent micturition ; the urine has a sourish smell ; the urine becomes very turbid, and deposits a reddish sediment.

Hepar Sulph. Calc. — Nocturnal enuresis ; weakness of the bladder ; the urine is passed slowly, without force, dropping perpendicularly from the

urethra; the urine is flocculent and turbid; dark yellow urine, burning while passing; brown-red urine, the last drops are mixed with blood; sharp, burning urine, which corrodes the internal surface of the prepuce; the orifice of the urethra is red and inflamed; discharge of mucus from the urethra.

Hedeoma Pul. — Suppression of urine; tenesmus; painful urination; cutting, burning pains in urethra; scanty emission of urine, with frequent and urgent desire; urine very dark, like black tea.

Hyoscyamus Niger. — Enuresis; paralysis of the bladder; retention of urine, with pressure in the bladder; frequent micturition, with scanty discharges.

Ignatia Amara. — Irresistible desire to urinate; painful pressure, with a scraping sensation in the neck of the bladder, especially when walking; turbid urine; frequent emission of watery urine.

Jodium. — Nocturnal urination; retention of urine; increased secretion of thick urine, with dark sediment; urine dark; turbid; milky; with a variegated cuticle on its surface; ammoniacal smell of the urine.

Kali Bichrom. — Frequent discharges of watery urine of strong odor; painful drawing from the perinæum toward the urethra; urine with white film, and deposit of mucous sediment.

Lachesis. — Copious emission of foaming urine; yellow-colored urine; copious brown-red urine; urine with red or brickdust sediment; turbid and dark urine, with a sediment of brown sand, and a severe cutting during micturition. Sensation as if a ball were rolling in the bladder.

Laurocerasus. — Retention of urine; pale yellow urine, scanty, acrid, depositing a thick reddish sediment; burning in the urethra, and pressing after urinating.

Lycopodium Clav. — Involuntary micturition; stitches in the bladder; frequent emission of large quantities of pale urine; frequent micturition at night, with rare and scanty emissions of urine during the day; urine dark, with diminished discharge; red, sandy sediment in the urine; painless hemorrhage from the bladder; itching in the urethra during and after micturition; greasy pellicle floats on the urine.

Mercurius Vivus. — The quantity of urine passed is larger than that of the fluid drank; burning in the urethra between the acts of micturition; inability to retain urine; frequent and violent desire to urinate, with scanty emission in a feeble stream; scanty red urine; urine turbid and fetid; dark red urine, as if mixed with blood; the urine is very turbid, and deposits a sediment; pieces of white filaments are emitted after the urine; the urine looks as if it contained pus or mucus, and has a sour smell.

Natrum Mur. — Involuntary micturition when walking, coughing, and laughing; desire to urinate day and night; stitches in the bladder during micturition, with a smarting, burning sensation in the urethra; pale urine, with brickdust sediment; discharge of mucus from the urethra; dark, coffee-colored urine.

Nitrate of Uranium. — Sore feeling in the pubic region; increased frequency of micturition; profuse nocturnal urination, straw-colored and fetid;

burning in the urethra, with very acrid urine ; desire to urinate immediately after voiding urine.

Nitric Acid. — Enuresis ; nightly desire to urinate, with cutting pain in the abdomen ; scanty, turbid, bad-smelling urine ; fetid urine ; smarting, burning pain in the urethra while urinating ; cramp-like, contractive pain from the kidneys toward the bladder ; discharge of bloody mucus, or of pus from the urethra ; the urine is cold when emitted.

Nux Vomica. — Retention of urine ; strangury ; painful, ineffectual desire to urinate ; painful emission of thick urine ; discharge of pale urine, followed by passage of thick, viscid, whitish, purulent mucus from the bladder ; reddish urine, with brickdust sediment ; burning and lacerating pain in the neck of the bladder during micturition ; hæmorrhœa.

Opium. — Atony of the urinary bladder ; retention of urine from a weakened condition of the contractile power of the bladder ; dark-colored urine, which deposits a brickdust sediment ; lemon-colored urine, depositing much sediment.

Pareira Brava. — Violent pains in the bladder ; pain in the thighs, extending down into the feet ; strangury, with paroxysms of violent pain ; the urine can only be voided while the patient is on the knees, with the head pressing against the floor ; the paroxysms more usually occur in the morning, from 3 to 6 o'clock ; the urine has a strong ammoniacal smell, and contains a thick, viscid, white mucus.

Phosphorus. — Involuntary emission of urine ; urine with a sediment of white flocculi ; smarting and burning in the urethra, with frequent desire to urinate ; tension over the region of the bladder : acrid, offensive-smelling urine ; brown urine, with red, sandy sediment ; hæmaturia.

Phosphoric Acid. — Enuresis, with cutting, burning pain in the urethra, and cramp pain in the region of the kidneys ; spasmodic constriction of the bladder ; profuse discharge of watery urine, in which immediately forms a white cloud ; milky urine, with bloody, jelly-like lumps ; burning in the urethra while urinating.

Phytolacca Dec. — Copious nocturnal micturition ; violent urging to urinate ; urine excessive in quantity, or scanty ; dark-red urine, which leaves a stain on the urinal of a mahogany color, which adheres very closely ; the urine deposits a chalk-like sediment ; pain in the bladder before and during micturition ; albuminous urine, with increased specific gravity ; frequent and painful inclination to urinate.

Plumbum. — Paralysis of the bladder ; tenesmus of the neck of the bladder ; ischuria ; difficult emission of urine ; the urine is mixed with blood ; copious red or yellow urine.

Pulsatilla. — Vesical catarrh ; incontinence of urine ; enuresis nocturna ; frequent desire to urinate, with a drawing sensation in the abdomen ; spasmodic pain in the neck of the bladder after micturition, extending to the pelvis and thighs ; involuntary discharge of urine when coughing ; the urine is discharged in drops when sitting or walking ; burning in the urethra while urinating ; hæmaturia ; scanty red-brown urine, with brick-colored sediment ; bloody or mucous deposit.

Rhus Tox.—Tenesmus vesicæ, with the emission of only a few drops of blood-red urine; diminished secretion of urine; incontinence of urine; urine hot, white, and muddy, or pale, with white sediment; dark urine, soon becoming turbid.

Ruta Grav.—Nocturnal enuresis; continual pressure on the bladder, as if always full; the desire to urinate continues after micturition; involuntary discharge of urine at night in bed, and while walking during the day; frequent urging, with emission of green urine.

Sarsaparilla.—Pain and cramps in the bladder, with urging and burning; urine pale and copious; frequent urging to urinate, with scanty but painless discharge; urine clear and red. Severe strangury, with discharge of white, acrid, turbid matter, with mucus; painful retention of urine; urine frequently voided; does not become turbid, but deposits a cloud; frequent and copious discharge of pale urine, which becomes turbid on standing, like clay water; urine either too frequent, copious, and pale, or scanty, slimy, flaky, clayey, or sandy; iridescent pellicle on the urine.

Sepia.—Nocturnal enuresis, especially during the first sleep; constant desire to urinate, with painful bearing-down in the pelvis in the morning; burning in the bladder and urethra; pressure on the bladder in the evening, with burning after urinating; urine turbid, with red, sandy sediment, and a cuticle on the surface; urine has an offensive smell, and deposits a white sediment.

Squilla Mar.—Tenesmus of the bladder after micturition; frequent calls to urinate, especially at night, with scanty emission, or profuse discharge of pale urine; sanguinolent urine, with a deposit of red sediment.

Stannum.—Painless retention of urine; the urging to urinate is absent, as in atony of the bladder.

Staphysagria.—Profuse discharge of pale urine, with urging; frequent desire to urinate, with emission of a small quantity of dark-colored urine, burning in the urethra during and after urinating; urging after micturition, as if the bladder had not been emptied.

Strychnia.—Atony of the bladder; retention of urine, or incontinence, when these conditions depend on impaired power of the detrusor muscle of the bladder, from over-distention.

Sulphur.—Nocturnal enuresis; violent desire to urinate at night; copious micturition after midnight; stitches in the bladder; cutting pain in the urethra while passing urine; the urine is sometimes clear, and sometimes contains a thick sediment; rose-colored urine; fetid urine, a greasy film forming on the surface.

Terebinthina.—Strangury; dysuria; violent dragging and cutting pain in the bladder; burning in the bladder; urine scanty and red, or bloody urine; difficult micturition; the urine has the odor of violets, with deposit of mucus, or a thick, muddy sediment.

Thuja Occident.—Frequent urging to urinate, with profuse emission; the urine looks like water when passing, but becomes cloudy on standing;

red urine, depositing a brickdust sediment; burning in the urethra during and for some time after micturition.

Uva Ursi.—Hæmaturia; painful micturition, with burning; urine slimy and purulent.

Veratrum Album.—Diuresis; involuntary emission of urine; painful pressure on the bladder, and burning during micturition; frequent but scanty emissions of dark red urine; green urine

SECTION IV.

Various Affections of the Penis.

I.—Phimosis.

Phimosis is an abnormal contraction of the terminal border of the prepuce, in front of the glans. It may be *congenital* or *acquired*, *acute* or *chronic*. Congenital, though rare, is when the prepuce is imperforate, or nearly so, and the urine, not being emitted, collects between the prepuce and glans, forming a sac or tumor. The acquired, is the result of cicatrization of ulcers or chancres, or is sympathetic with gonorrhœa, balanitis, etc. Frequently constitutional symptoms are developed in the chronic variety, varying from nervous derangements to complete incoördination of motion, and loss of equilibrating power. In the acquired variety the preputial secretion is retained, producing much irritation, and occasional attacks of inflammation, with discharge (balanitis). (Fig. 155.)

Fig. 155.



Treatment.—The remedies curative of this affection, if surgical action is not demanded, are *Acon.*, *Arn.*, *Ars.*, *Caps.*, *Cann.*, *Calc.*, *Hepar*, *Euphras.*, *Hyperic.*, *Merc.*, *Rhus*, *Sepia*, *Thuja*, *Sulph.*, *Viola tri.* The remedy is to be selected in accordance with the constitutional and local manifestations.

The *local treatment* consists of warm medicated lotions of *Calend.*, *Hyperic.*, or *Thuja*, frequently employed. When all medical agents fail, recourse may be had to an operation; viz.: If the foreskin is long and tight, or thickened by cicatricial surfaces, draw it well forward, hold between the blades of a forceps,

and cut off by one sweep of the bistoury.* (Fig. 156.) In cases of less severity, the prepuce may be slit up on the dorsum as far as the base of the glans, by means of an oiled director passed

Fig. 156



underneath the foreskin. (Fig. 157.) The chief seat of constriction being in the mucous membrane, care should be taken that

Fig. 157.



it is well opened, and a second piece snipped out, if necessary, and stitched to the skin. Apply cooling lotions of *Hypericum* to the parts after operation, to prevent inflammation. *Rupturing* the mucous membrane by Hutchinson's forceps has proved successful.

II. — Paraphimosis.

Paraphimosis is the reverse of the former. When the prepuce is drawn over the glans, and allowed to remain there, producing contraction and stricture of the foreskin, serious results may follow. The penis is constricted,

* Dr. E. P. Hurd reports a case where locomotor ataxia was developed in a lad seven years of age. Various methods of treatment were employed, unsuccessfully. The true cause of the disorder proved to be phimosis; and circumcision was performed, with gradual improvement and final recovery. Dr. Thompson, of Albany, N. Y., reports a case where epileptiform convulsions followed phimosis. This also recovered by circumcision.

the skin becomes œdematous, and the mucous lining of the prepuce, and the glans, become congested, followed by ulceration or sloughing; and the strangulated glans, being ill provided with resistant power or control, may become gangrenous, and ultimately die. (Fig. 158.)

Treatment.—In recent cases, efforts should be made to reduce the stricture, and release the glans from its incarceration. The parts having been well oiled, the surgeon takes the penis between the fingers of both hands, and draws the constricted portion slowly but steadily forward; with the thumbs, at the same time, he compresses the glans, and pushes carefully backward. If this fails, the constriction may require division by raising a fold of the skin by introducing a sharp-pointed bistoury beneath the tightened band, and cutting outward, when reduction can be effected. Local applications of *Hypericum* or *Staphysagria* should be employed, and the patient placed in a recumbent position, with the penis elevated, so as to favor the circulation of the blood through the weakened parts.

Fig. 158.



The following remedies may be beneficial in overcoming the inflammation in the external structures: *Arnica*, *Apis*, *Arsenicum*, *Mercurius*, *Calendula*.

III.—Herpes of the Glans and Prepuce.

These eruptions are characterized by the formation of small vesicles or excoriated points upon the mucous membrane of the glans, attended by smarting and itching, and chiefly occurring in persons of a gouty dyscrasia, with an irritable mucous membrane. Treatment will be required to overcome the constitutional irritation. Local lotions of *Rhus rad.* or *Ranunculus* are very beneficial. Internal remedies are *Dulc.*, *Hepar*, *Graph.*, *Merc.*, *Phos.*, *Rhus tox.*, *Ranunc.*, *Sarsap.*, *Sepia*, *Tellur.*, *Tiglium*. Cleanliness should be observed.

IV.—Hypertrophy of the Prepuce.

Hypertrophy of the prepuce is the result of chronic irritation or disease; is usually limited, but may become so extensive as to

call for surgical interference. It consists of solid œdema of the areolar tissue of the prepuce, and of the sub-integumental structures of the body of the penis, which becomes enlarged and club-shaped. For remedies, consult *Nat carb.*, *Graph.*, *Elaps cor.*, *Cal. seg.*, and *Puls.* Surgical relief consists in the excision of a V-shaped piece from the dorsum of the penis.

V.—Condylomata, Warts, or Sycosis.

Condylomata, Warts, or Sycosis, often follow gonorrhœa, particularly if the patient has not observed due cleanliness, the discharge being permitted to lodge beneath the prepuce. They are generally situated along the corona or on the frænum; in females they occur about and in the pudenda. They present different appearances; are fig-shaped, cauliflower-like, or like a cock's comb, pear, or raspberry.

Pathology.—The pathological condition is a morbid thickening of the chorion, rete mucosum, and epidermis, with hypertrophy of the papillary body. They sometimes appear at the verge of the anus, the angles of the mouth, and on the perinæum; are soft, spongy, bleed easily, and are liable to return after cauterization, excision, or ligation. They secrete a peculiar gleety and fetid fluid, and are dependent upon venereal infection.

Treatment.—The remedies are: *Acid nit.*, *Cann.*, *Lyc.*, *Phos. ac.*, *Calc. carb.*, *Merc. cor.*, *Magn.*, *Staph.*, *Sabina*, and *Thuja*. I have never failed in the cure of these little pests by excision, and *Nitric acid* or *Thuja* applied to the base, and at the same time given internally.

VI—Horny Excrescences.

These formations sometimes spring from the glans penis, and appear first as soft, semi-transparent masses, enclosed in complete cysts. As they increase in size they become dense and hard, and assume all the characteristics of horny structure. They grow slowly, and sometimes attain considerable size. An instance of this growth is reported by Dr. Jewett, of Connecticut, who describes it as $3\frac{1}{2}$ inches long and $\frac{3}{4}$ of an inch in diameter at the base. The treatment is the same as that for other horny tumors; which see.

VII. — Priapism.

Persistent priapism is the result of excessive venery. The erection of the penis is not accompanied with any sexual desire, but is attended with great pain, a feeling of weight about the perinæum, and much anxiety and constitutional disturbance. The organ is singularly hard and unyielding, and may remain in this condition for hours and even days.

The *pathology* of this disease is supposed by some to be the result of extravasation of blood into the corpora cavernosa; by others it is referred to sympathetic or reflex nervous irritation. A case of this kind I saw many years ago, at St. Louis, in a newly married man, where the organ became so hard and unyielding that I was compelled to incise the corpora cavernosa and let out a quantity of blood. After a few hours, with three or four doses of *Aconite*, given internally, and followed by *Capsicum*, I succeeded soon in overcoming the trouble.

VIII. — Gangrene.

Gangrene of the penis occurs in broken constitutions, from syphilitic phagedæna, or as the result of gonorrhœal phimosis. This is an exceedingly rare disease at the present time, owing either to non-Mercurial complication, or to the gradual decrease of the more virulent forms of syphilis. The treatment is like that for gangrene in other parts; which see.

IX. — Fibroid Tumor of the Penis.

The penis may become the seat of this formation, in common with other structures of the body; and the tumor maintains the same peculiarities that occur in the ordinary fibroid growth, and is treated the same as in other parts. (Consult Franklin's Surgery.)

X. — Hypospadias.

Hypospadias is an arrest of development in the mesial line of the penis, leaving a slit or a fissure connecting with the urethra; occurring on the under surface of the organ, and confined to the glans and upper part of the penis; though it occasionally extends backward to the root of the organ, cleaving the scrotum in twain, being sometimes erroneously considered as an example of hermaphroditism. (See Part XVIII., Franklin's Operative Sur-

gery, p. 657: "Malformation of the Urethra.") The treatment consists in plastic operations; though they are mostly incurable.

XI. — Epispadias.

Epispadias is the reverse of the former, where the deformity occupies the upper surface of the penis. It is a rare deformity, and is referred to the condition termed extroversion of the bladder. (See Part XVIII., Operative Surgery, p. 657.)

SECTION V.

Various Affections of the Testes.

I. — Chronic Orchitis.

Chronic orchitis, or *sarcocoele* of some authors, may be the result of an imperfectly cured acute orchitis; or it may be chronic from the commencement of the disease, resulting from gonorrhœa, or occurring as an independent affection. The epididymis is often the primary seat of the disease, which gradually involves the whole gland, which presents the appearance of an inelastic, uniform, oval tumor, exceeding two or three times the size of the normal testicle. The disease progresses insidiously; is more severe at night than in the daytime; the sensitiveness of the gland is largely lost. When it is accompanied with effusion within the tunica vaginalis, it is termed *hydro-sarcocoele*. Its *pathological* structure consists of a yellow, solid lymph, effused into the substance of the gland, extending into the vas deferens, and deposited in the tubuli seminiferi. Its smoothness, uniformity, gradual progress, and the absence of glandular enlargement, distinguish it from malignant disease of the testicle.

Treatment. — Rest in a recumbent position, with applications of *Hamamelis*, *Belladonna*, or *Hypericum* lotions, the scrotum being supported by a hair pillow, as in all cases of inflammation of its external structures. Give one of the following remedies: *Aur.*, *Clem.*, *Agnus cast.*, *Graph.*, *Argent. nit.*, *Bell.*, *Kali carb.*, *Kali jod.*, *Lyc.*, *Rhod.*, *Merc.*, and *Rhus*. Strapping the testicle, and use of a suspensory bandage. (See "Orchitis.")

II. — Fungoid Growths of the Testicle.

These growths from the testicle, following orchitis, are of two varieties, *benign* and *malignant*. In the benign, the mass is granular, hard, very sensitive, not disposed to heal, and bleeds easily. The growth is paler and more consistent than the latter, with tumefaction of the cord. Pressure upon the testicle produces that peculiar sickening sensation resembling a healthy condition; while the malignant is soft and spongy, color darker, with frequent attacks of hemorrhage, and pressure upon the testicle gives no sickening sensation.

Treatment. — The remedies are *Merc. viv.*, *Phos.*, *Clem.*, *Calc. carb.*, *Ars.*, *Con.*, *Baryt.*, *Carbo veg.*, *Mez.*, *Kali carb.*, *Nit. ac.*, *Spong.*, *Oleand.*, *Thuja*. When remedial agents fail, castration is the only means of relief. (See remedies for orchitis.)

III. — Cystic Sarcocoele.

Cystic sarcocoele is an enlarged, somewhat elastic, indurated, lobulated, and globular tumor occupying the testis, attended with weight, heaviness, aching, and numbness, with an enlarged and varicose state of the veins of the cord. It is a rare disease, grows insidiously, with cystic fluctuation at its upper portion, resembling somewhat hydrocele of the cord. The enlarged testicle may become of very great size.

Pathology. — A stroma of various modifications of connective tissue in all stages of growth, in the midst of which are irregular epithelial spaces, which dilate and form cysts lined by epithelium. It may become malignant by degeneration, the stroma assuming the form of cancer, and the epithelium taking on the true carcinoma cells. It is said by Curling to be the result of morbid changes in the ducts of the rete testis. It may be confounded with hydrocele; but the absence of translucency, its globular shape, weight, and the varicose state of the veins of the cord, will determine its nature. An exploratory incision will solve all doubt, or the use of the aspirator will determine diagnosis.

Treatment in Dubious Cases. — *Apis.*, *Clem.*, *Calc.*, *Dig.*, *Ars.*, *Con.*, *Graph.*, *Lyc.*, *Plat.*, *Sepia.*, *Sil.*, and *Sulph.* I cured two cases of well-marked cystic disease of the testicle with *Apis* and *Conium*. Removal of the diseased gland is the last resort of the surgeon.

IV. — Enchondroma of the Testicle.

This is a frequent accompaniment of cystic sarcoma, and may appear alone, deposited in larger or smaller nodules, or infiltrating the gland. Its usual seat is the body; but it may invade the epididymis. When it attains a large size, it loses its purely cartilaginous character, and is found mixed with sarcoma tissue, and complicated with cysts, and merges into the disease just considered. For treatment, consult "Enchondroma," under the head of "Tumors," Franklin's Surgery.

V. — Cancer of the Testicle.

Cancer of the testicle, or malignant sarcocele, invariably assumes the encephaloid character, and is the only form of cancer ever occurring in that gland. *Symptoms*: Dragging pain and weight, with induration and enlargement; tense and elastic, but smooth and heavy; as it increases, it becomes rounded, doughy, or pulpy, sometimes hard and knobby; the cord becomes enlarged, hard, and knotty, and the scrotum becomes adherent to the growth; ulceration ensues; and finally a fungus projects, when all doubt will be removed as to the nature of the malady.

Treatment.—Refer to carcinoma. Removal of the organ is advised; to be of permanent service, it should be done early.

SECTION VI.

Stricture, Prostatitis, Etc.

I. — Spasmodic and Inflammatory Stricture.

Stricture of the urethra may be either *spasmodic* or temporary, *inflammatory* or pathologic, *organic* or permanent, involving three distinct conditions. In the first, there is a spasmodic action of the muscular tissues surrounding the urethra;—the result of high living, stimulation, exposure, free sexual indulgence in persons of excessive nervous irritability; irritation in the rectum, dependent upon ascarides, hæmorrhoids, fecal accumulations, etc. The second proceeds from congestion or inflammation in the structures of the urethra, wherein an inflammatory stricture exists. It occurs in gouty and rheumatic subjects, suffering from irritability of the skin and mucous membrane.

The size of the male urethra, as influenced by the size of the penis, has been made the subject of much controversy. Dr. Otis contends that there always exists a constant relation between the size of the flaccid penis and the capacity of the urethra. Helmuth and others, on the contrary, maintain an opposite opinion; and my experience corroborates that of Professor Helmuth, "that a small penis may have a large urethra, and the tube may be of small caliber in an organ of good size." The urethra is subject to abnormal contractions along its whole extent. The portions of the urethra most liable to stricture are also a matter of dispute. I am inclined to accept the views of Dr. Otis, that a large proportion of strictures are found within the first *four inches* from the meatus, and they decrease in frequency as you measure toward the vesical opening. In one respect, however, all authors agree in assigning the most frequent position to be at the sub-pubic curvature. Small urethras are more predisposed to stricture than large ones; in all cases the danger of permitting gleet to run on indefinitely is very great, as it will almost invariably eventuate in stricture, and of itself should arouse the apprehensions of the surgeon as to the existence of stricture.

Treatment.—Spasmodic and inflammatory stricture yield readily to appropriate medication. In the early stages, prompt relief will be afforded by the sitz bath, hot sponge, or hot fomentations to the perinæum, Richardson's Nebulizer, Chloroform; or either of the following remedies, in accordance with their pathogenesis, may be given: *Acon.*, *Bell.*, *Canth.*, *Con.*, *Lach.*, *Graph.*, *Gels.*, *Camph.*, *Clem.*, *Dig.*, *Merc.*, *Eupat. purp.*, *Cann.*, *Nux vom.*, *Thuja*, *Petros.*, *Prunus spinosa*, *Sandalum*, etc. A soft, flexible catheter or bougie may be used after the inflammatory contraction has in part yielded, which may be employed from time to time, till all pathological conditions have yielded to treatment. (Consult "Special Indications," at the end of this section.)

II. — Organic Stricture.

Permanent or organic stricture is the result of inflammation in or near the urethra; it is due to the organization of plastic lymph during the inflammatory stage, either upon the surface or into the submucous areolar tissue; and is caused by ill-treated gonorrhœa, ulceration, intemperance, morbid urine, or traumatism. It varies in form, sometimes being annular, long, or one-

sided, and partakes of a gristly, cartilaginous material, blocking up and contracting the urethra. Its most frequent seat is in front of the pubic arch. Once formed, it tends to become worse.

Pathology.—Contraction gradually increases the size of the urethra behind the stricture, which dilates and becomes sacculated. The muscular coat of the bladder thickens and hypertrophies, sacculi are formed, and the mucous membrane is disordered. Its evil influences gradually extend backward, the ureters become distended and tortuous, the kidneys congested, and prone to inflammation. Calculi may be formed, and a general nervous depression is produced. It is not a disease of advanced life, except when it proceeds from venereal disease.

Symptoms.—Frequent desire to void urine, with pain and difficulty; stream diminished, twisted, forked, or scattered; urine dribbles away after evacuation; uneasy sensation in perinæum; itching at the glans, with gleet discharge. As the affection progresses, all symptoms increase; irritation extends to the testicles, prostate, and thighs. In bad cases, the urine passes drop by drop, with much straining; rigors or prostration; fits of retention take place, through congestion and spasm; pain during coitus, with a sense of heat and soreness in perinæum.

Treatment.—The first thing to be done in the treatment of stricture is to ascertain its locality and extent. To accomplish this, the urethra-meter of Otis is most reliable. It is introduced into the urethra closed; and, having passed it onward as far as the membranous portion, the surgeon turns the screw in the handle, until a sensation of fullness is felt by the patient, when it is gradually withdrawn till it engages the stricture. At this point the screw must be turned in the opposite direction until it is reduced to such a size that it will pass the obstruction. The hand on the dial will mark the size of the stricture. The *bougie à boule*, or the metallic bulbous sound, is also used to define the locality and extent of the stricture. Dr. Otis has invented a urethral endoscopic tube for viewing the interior of that canal. It is six inches in length, and from 17 to 19 of the English scale. Having ascertained the location and extent of the stricture, the next process is its cure, or rather to restore the canal to its normal caliber, and maintain it in that state. To the accomplishment of this object, the profession is greatly indebted to Dr. Otis, of New York, for his valuable suggestions and practical

experience in the treatment of this disease. The question then presents itself, whether we shall follow the treatment of Dr. Otis, of slitting open the stricture, divulsing it, or overcoming it by dilatation. The last of these processes is, I think, the best adapted for the cure of the stricture. These mechanical measures are: 1st. Dilatation by a bougie or sound; 2d. Dilatation by means of expanding instruments; 3d. By a catheter retained; 4th. By the caustic bougie; 5th. By incision from within; 6th. By external incision, or dividing it from the perinæum. Compensating strictures occur in front of the main one, and the anterior portion of the canal becomes alternately dilated and contracted by the stream of urine being deflected in an oblique direction after it passes the first obstacle. The point of impingement against the urethral wall takes on inflammatory action, and the result is a compensating stricture. Like all derangements of compensation, the secondary stricture relieves the morbid status of the primary one.

Early attention should be given to all disorders of the system, mental disquietudes, and especially those involving the pelvic organs; chastity, temperance, rest, early hours, warm baths, and remedies given to meet the various subjective symptoms that may arise. In this way very much relief may be obtained, and, in some cases, cures have been effected. The chief remedies are: *Dig.*, *Clem.*, *Eupat. purp.*, *Prunus*, *Sepia*, *Gels.*, *Bell.*, *Thuja*, *Nit. acid.*, *Kali iod.*, and medicated plasters to the perinæum. When medication fails, then use the second class of remedies, which is to restore the urethra to its normal caliber, and to maintain it so. This is done by gradual or forcible dilatation, incisions, or electrolysis. Gradual dilatation consists in passing a graduated bougie from time to time until the urethra is restored. In very bad cases, use a horse hair, a filiform bougie, a whalebone guide, or a metallic sound. Be careful of the entanglement of the instrument in one of the lacunæ, and beware of *false* passages. A skillful hand will detect the slightest irregularity or accident. Remember, every stricture can be cured that permits the slightest flow of urine. Dilate *gradually*, if possible, and begin with the smallest filiform bougie, increasing the size from time to time till restoration of the canal. *Rapid and forcible* dilatation may be made when the stricture yields readily, and time is of the greatest moment to the patient. This is effected by divulsion (Otis's or Holt's dilators), or internal division by the urethrotome. In the

the stricture *entirely*.
Otis's bulbous sounds.
It may be required
success is desired, the
requires great care.
as well as consider-
external operations are
of the stricture
its own advo-
to the meatus.
Otis's division, thus writes :
urethral stricture, not-
the contrary. I think
that, in the great
complete eradication
competent surgeon.
the stricture must
and this cannot be
knowledge of the *normal*
ascertained by means
of the flaccid penis, the
stricture at some one
with the judgment of
be selected as the
the procedure must
every fiber of the
completely severed,
other division alone.
ing this with any
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urethrotome was
necessary require-
as the principles of
this: "In all cases of
seemed to make the
very thoroughly,
freedom to the
insisted on, and not
as a means of prevent-
the penis, Dr. Otis
rubber tube arranged

so as to encircle the penis, and through which water of any desired temperature is carried by syphonic action." In none of the 100 cases reported by him, has subsequent dilatation been attempted or required, to effect a cure after the healing of the wound made during the operation. The use of sounds subsequent to the operations, is simply to separate the cut surfaces, and not for the purposes of dilatation, and their use is discontinued so soon as a full-sized bulb can be passed through and beyond the previous site of stricture, and withdrawn without a trace of blood accompanying or following the use of the instrument. "Recontraction of stricture after operation is simply due to the incomplete division; and this will, as a rule, be detected within one week, or at most, two weeks, by which time stricture tissue *distended*, not *divided*, will sufficiently recontract to become readily recognized by the full-sized bulb. If, then, no stricture can be recognized, the cure of the difficulty may be considered complete, and no further treatment will be required." The urethrotome of Dr. Otis, is one of the latest and very best instruments devised for that purpose. It is made to cut from before backward; and, in my hands, it has equaled its fullest commendation. Nevertheless, I hold it as a rule, that every stricture can be cured by dilatation, that permits the passage of the smallest filiform bougie through it.

All organic strictures of large and small caliber, are to be treated at first by dilatation; should this *fail*, other means will be required. In organic stricture, a surgical operation is of the first importance to consider; and the use of the bougie or sound is the first step to be taken, commencing with an instrument as large as the stricture will admit, that will pass the contracted part, and gradually increasing the different sizes till the urethra has been restored to its normal caliber. Having oiled the bougie thoroughly after warming it, introduce it carefully into the urethra, and pass it gently along till it engages the stricture; then press it onward cautiously, turning it in various directions, corresponding with the sinuosities of the urethra, till it passes the obstacle and enters the bladder. The *conical*, nickel-plated steel sound, an instrument made on the principle of the short curve, greatly facilitates introduction, especially when the stricture is at or near the triangular ligament, the point hugging closely the roof of the canal. The instrument, acting upon the double principle of the wedge and

lever, possesses considerable power, and should be used cautiously. My plan is to introduce as large a conical instrument as will pass the stricture, and, after letting it remain for five minutes or more, gradually withdraw it. The immediate effect of this is an increase of pain, urging to urinate, and a mucopurulent discharge, which subsides in a day or two, generally; if it does not, a few doses of *Sepia*, *Dig.*, *Cann.*, or *Clem.*, will soon dissipate it. In four or five days all inflammatory action will pass away, and the urethra will regain its previous condition. In forty-eight or even twenty-four hours more, the same instrument may be passed again, and be permitted to remain ten or twelve minutes. The third time it may remain fifteen or twenty minutes; and so on. Each time of instrumentation, the symptoms will be less aggravated; and improvement will begin earlier, and be more decided. It is not until the passage of the instrument produces little or no perturbation in the urethra, that a larger one may be used, in the same manner as the preceding; and thus we shall continue until the constricted portion of the canal is restored to its normal caliber. The great difficulty heretofore has been, that practitioners are too anxious to cure their patients in the quickest time possible. Nothing is more injurious to the patient, and more offends the delicate lining of the urethra, than this rapid and forcible method of cure. It is on this very account that we hear of so many failures to cure this disease, and complications that follow in the track of this method of rapid dilatation. The most satisfactory and effective treatment, especially by large instruments, is that detailed above, which should be continued till all symptoms of stricture have disappeared, and then gradually withdrawn, so that instrumentation will be effected once a month only, for two or three treatments. In this way, I have cured some of the most violent forms of stricture, that have been pronounced incurable except by operation, and I have seen these cases remain well for years without giving any evidences of urinary trouble. I am decidedly opposed to the old and baneful method of retaining an instrument in the urethra for days at a time, and only withdrawing it to cleanse and re-introduce.

Resilient strictures of large caliber, which are recognized by a gleet discharge and other accompanying symptoms of a narrowing of the urethral canal, are not so readily cured by the method of treatment just detailed. In these cases, it will be

observed, first, that the patient's general health antagonizes the cure by local means alone, as is evidenced by the tendency to catarrhal affections, and other disturbances of the mucous membranes, that first demand active interference on the part of the practitioner. Before treating the stricture, therefore, attention must be given to the cure of the patient's general condition, and especially to the hygiene of the sexual organs. Many of such patients have been permanently cured by marriage, after all other means, afforded by dilatation and incision, have failed; others have been permanently benefited by change of climate, and such general restoratives, including the continued wearing of a supporter, when preceding treatment, mechanical and otherwise, had effected little or no good. The continuance of this variety of stricture seems to depend upon some systemic dyscrasia which seizes the genital organs, probably on account of some hereditary or acquired weakness at this point, and there expends its disease-producing force: it is simply idle, therefore, to attempt to cure this stricture until the constitutional cause has been eradicated.

The really *resilient* strictures, that possess within themselves that "tenacious cicatricial and retractile" power to withstand advantageous dilatation, in which the symptoms yield but do not entirely disappear, are the most obstinate of all strictures to cure. If this stricture is situated under the pubic arch, it should be treated by gradual and continuous dilatation, or that method which has accomplished the best results in my hands; viz., electrolysis; to which the reader is referred, under the heading of "Electrolysis," pp. 157-160. If dilatation is employed, it should be carried gently and persistently to the greatest limit of distention; then, by the use of one or more of the remedies recommended for urinary troubles, for a long time persevered in, the best and most satisfactory results will be produced. If, on the contrary, this kind of stricture is situated without the pubic arch, internal urethrotomy, thoroughly done, is not only a safe procedure, but it affords the best chance of success, not only in ridding the patient of all unpleasant symptoms connected with his disorder, but also of the necessity of employing further mechanical dilatation.

Organic strictures within the pubic arch, after dilatation to the extreme limit, will not always remain cured, except by the occasional use of instrumentation, from time to time, as circum-

stances demand; but, when we consider the danger that attends internal urethrotomy in such cases, it is far better to maintain the caliber of the canal by the occasional passage of a full-sized bougie during the rest of the patient's life, than to accept the risk that attends its internal division by any known method.

External Urethrotomy.—External urethrotomy may be justified only in exceedingly obstinate cases, in traumatism, or in impassable strictures. Syme's method, or rather modification of external incision, is the only safe and sure means of performing this operation from without. The patient is placed in the lithotomy position, a grooved director (after dilatation of the stricture) is passed through the stricture, the left forefinger as a guide introduced into the rectum, and a straight bistoury, its back to the rectum, is plunged into the median line of the perinæum, behind the stricture, and *into the groove of the director*, when the bistoury is made to divide the stricture from behind forward. Another method, which I hold to be preferable to this, is to shave the perinæum, introduce a capillary whalebone bougie (probe pointed) carefully into the bladder, pass along this a grooved metallic staff, engaging the free end of the guide, an assistant holding the staff and guide. The surgeon, after an examination per rectum, incises freely the skin and superficial fascia of the perinæum, along the median line, from the base of the scrotum to within half an inch of the anus. Dissect inward, till the urethra is seen, and divide it, the knife falling into the groove of the catheter. The edges of the urethral incision are kept open by loops of silk. After withdrawing the guide, the stricture and a corresponding portion of the urethra are divided by a modified canalicular knife. The catheter is now introduced into the bladder. I have performed this latter operation three times successfully; yet I regard it as a principle which should guide every surgeon, that, while a director or curved grooved staff can be made to pass the stricture, external urethrotomy is never justifiable: internal urethrotomy produces the best results. A catheter may be retained in the bladder by placing a ring around the penis, which is secured to the body, and attaching two pieces of narrow tape from the rings of the catheter to the ring around the penis. Another simple contrivance is to pass around the catheter a piece of thin gauze or linen, and make it encircle the penis; then put around all an India-rubber ring. A catheter may be retained in the female bladder by a T-bandage, and two narrow pieces of

tape attached to the two tails of the vertical portion of the roller.*

Electrolysis.—This is the best, most satisfactory, and most rational means of treating stricture, under any form or method. The *modus operandi* is as follows: "Introduce into the urethra an electrode, *soaped*, not oiled, one size larger than the stricture will admit (insulated to the tip), down to the stricture; attach to the *negative* pole of the battery; complete circuit by the broad sponge rheophore, moistened with salt and water, placed in the hand of the patient or upon some part of his body. As soon as the patient *feels* the current, the intensity is sufficient, and should not be increased beyond this point. Be careful to avoid all production of pain, keeping the electrode pressed in contact with the stricture, but not forced; in a few minutes we find the electrode slipping through the stricture easily. If a second stricture is found, treat it in the same way. Repeat this operation every few days, till the stricture is cured. A current from six to twelve cells of McIntosh's elements† is all that is needed. Great stress is laid upon the introduction of the *negative* electrode; as the positive produces an eschar which heals by cicatrization, and, instead of curing a stricture, will increase it. I have seen this method tried with most brilliant results in several cases. For subsequent internal treatment of the urinary and other troubles that arise during the local treatment recommended in this disease, see remedies presented under the heading of "Special Indications," at the end of this chapter.

III. — Retention of Urine.

Retention of urine must not be confounded with suppression, wherein no urine is secreted; but it is an inability to void the contents of the bladder. There are two varieties: the first, from a want of power in the bladder to perform the act; and the second, from an obstruction to the passage of urine. The first is due to some lesion of the spinal cord, followed by paralysis. The urine

* See section on "Bandaging," pp. 52-95.

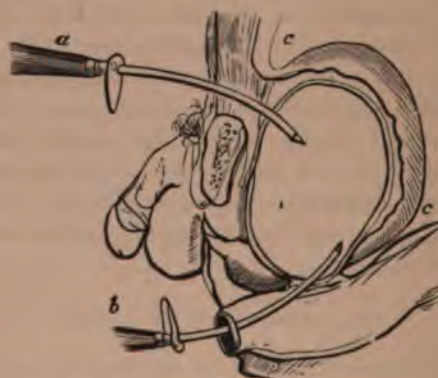
† McIntosh Galvano-Faradic batteries are by far the best instruments for performing electrolysis that I have ever used. I have been so many times disappointed in the use of other instruments, that I have at times abandoned the idea of this brilliant and successful method of cure. Since my attention has been called to the McIntosh instrument, I have made two remarkable cures of this terrible disease, and I cannot too highly recommend its use.

collects in the bladder, is forced out, and dribbles away by the urethra. (For treatment, see "Cystitis," pp. 338, 339.)

Symptoms.—Retention from obstruction; has an urgent desire to pass water, with inability; straining; pain, with great anxiety and distress; the bladder rises above the pubes, forming an elastic, fluctuating tumor, dull on percussion; if retention is not removed, the ureters become involved, the kidneys are affected with pyelitis, suppression, followed by coma and death. It frequently happens that the urethra yields behind the point of obstruction, and extravasation of urine results.

Treatment.—When retention results from stricture, or enlargement of prostate, the cause must be removed if possible, by catheterization; if this cannot be effected, try warm baths, Belladonna enemata, Chloroform, anæsthesia, Electro-Magnetism; conjoined with one of the remedies recommended under the head of

Fig. 159.



"Special Indications," at the end of this chapter. If all means fail, recourse must be had to puncture by trocar and canula, through the rectum behind the prostate, or above the pubes (Fig. 159), or by aspiration: the latter is by far the safest and freest from danger. After relief, attention must be given to removal of the cause.

IV.—Extravasation of Urine.

Extravasation of urine may proceed from the bladder or urethra, by ulceration, from surgical operation, by direct violence, by stricture, or by traumatism.

Symptoms.—Patient is conscious that something has given away, perhaps while straining; the rupture is in front of the triangular ligament; relief is afforded; soon the scrotum and lower abdomen become infiltrated with urine; the skin is stretched, crepitates, feels doughy, and, if not met with free incisions, sloughs and becomes gangrenous; inflammatory symptoms of an asthenic type follow; the tongue is brown; great prostration ensues, with a tendency to delirium. If extravasation is from injury, the rupture occurs in the urethra, perhaps in the bladder, the latter being most certainly fatal.

Treatment.—Free incisions, to give vent to the imprisoned urine, and the case treated as in gangrene.

V.—Urinary Abscess.

Urinary abscess is a frequent result of stricture, and follows ulceration of the urethra, terminating in abscess in the perinæum, taking its origin from the bulb or membranous portion of the urethra.

Symptoms.—It begins as a small, hard, circumscribed, and painful tumor in the perinæum, and increases steadily; produces some constitutional trouble, with weight and throbbing in the perinæum, heaviness in the loins, uneasy sensation at neck of the bladder, with shivering, nausea, and febrile manifestations; suppuration results, the pus is discharged naturally or artificially, and there remains a fistula through which urine continually escapes.

VI.—Urinary Fistula.

Urinary fistula forms most frequently in the perinæum, as a consequence of stricture or urinary abscess, as above stated. They are sometimes met with in the groin, inside of the thigh, and in the scrotum; they are usually single in the scrotum and penile portions of the urethra, but are numerous in the perinæum; they differ in size and tortuosity; the scrotum and penis become enlarged, indurated, and almost cartilaginous in structure; the urine oftentimes is entirely voided through these openings. Fistulas may likewise arise from injuries or falls, by which the urethra is ruptured; the urine is then extravasated into the loose cellular tissues of the perinæum and scrotum, where it occasions much inflammation and distention of the textures, merging, per-

haps, into gangrene and sphacelus, and becoming a disease of the most serious import. It sometimes lays bare the urethra and testicles; at others, it dissects its way in different directions, producing one or more fistulas, and endangering the patient's life. A very interesting case of this kind was presented at my clinic at one time, U., of M., where there were *two* fistulas, the one terminating in the rectum, the other above the pubes, and about midway between the symphysis and the anterior superior spinous process of the ilium. I operated upon this case after the rectal opening was occluded, by making Syme's external urethrotomy, opening into the urethra at the point of rupture, and introducing a seton into the pubic fistula, downward to the urethra, and emerging it at the perineal opening. Within three days I had the satisfaction of seeing all the urine pass through the new orifice alongside of the seton. I gave directions to have a strand or two of the seton removed every day or two after the stream was well established through the perineal opening, with the intention of closing and healing up the pubic fistula, and transferring it to the perinæum; and the boy returned home under the care of his physician, with the intention of returning to have the case completed. By some inadvertence, the seton came out; and, as a consequence, the perineal opening closed, and the urine again escaped through the pubic aperture. The case fell into the hands of another surgeon; several unsuccessful operations were made. The patient grew rapidly worse, and was sent home in a more serious condition than when he left me. Since then, I have no knowledge of the case.

Treatment.—The first thing is to dilate the urethra, and establish the natural channel for the urine. The next, to cure the fistulæ; this may be done by free incisions to the bottom of the fistulæ, and dressings applied so as to heal them from the bottom to the surface; it is often effected by constitutional and local remedies. The remedies of most service are: *Ars.*, *Berb.*, *Calc.*, *Carb. an.*, *Phos.*, *Puls.*, *Sil.*, and *Sulph.*; in small fistulæ, Cantharides in tincture injected into the sinus; incisions and Galvanism, and a urethro-plastic operation may be required.

VII.—Prostatitis.

The acute form is produced by gonorrhœa, injuries, irritation of the genitals or rectum, and exposure to cold or wet.

Acute Symptoms are pain; heat in perinæum; tenderness on deep pressure; frequent micturition, and with difficulty; painful evacuation of the bowels; rectal exploration denotes enlargement of the gland, and tenderness to touch; fever and thirst accompany; terminates in resolution, suppuration, or abscess.

Chronic prostatitis is common to old age, and comes on insidiously. There are weight and fullness in the perinæum, extending to the anus; pain with diminished power in voiding urine; urine cloudy; gleet discharge; pain in coitus and defecation, and sometimes spermatorrhœa, and cystic irritation; muscular fiber hypertrophied. Sometimes the whole gland is enlarged; at others, one lateral lobe; occasionally, the middle lobe, between the "ejaculatory ducts," is involved. This alters the course and dimensions of the urethra. It will be *twisted* when one lateral lobe is enlarged; *flattened* and *compressed*, when the posterior middle lobe is hypertrophied. As a consequence, the urine is passed slowly and with great pressure; incontinence, discomfort, and urinary tenesmus follow.

Treatment.—*Acon.*, *Bell.*, *Hepar*, *Puls.*, *Merc.*, *Thuja*, for the acute; and *Agnus*, *Alum.*, *Bar. jod.*, *Calc. jod.*, *Con.*, *Dig.*, *Caut.*, *Lyc.*, *Kali hyd.*, *Iod.*, *Hepar*, *Senecio*, *Sepia*, *Sil.*, *Puls.*, *Thuja*, and *Sulph.*, for the chronic. Long continuance of the appropriate remedy is required. In the surgical treatment, use the long shaft and large curve, or ordinary sound. The vertebrated bougie is highly recommended in aggravated cases.

VIII.—Senile Hypertrophy of the Prostate.

This affection, peculiar to old age, consists of an hypertrophy or enlargement of the natural muscular structure, and incidentally of the glandular. The increase may be but slightly above the normal size, that of a chestnut, to the bulk of a man's fist, or even larger. If it affects the whole organ uniformly, the prostatic portion of the urethra will be lengthened; if one side is involved more than the other, the canal will be twisted; if it affects the posterior median portion, the part which lies between the ejaculatory ducts, enlargement of what is called the *middle* or *third lobe* takes place, when the prostatic portion of the urethra is either very much narrowed, twisted, or obstructed, or it is extended into a sort of pouch, which eventually contains calcareous formation, thereby adding to the sufferings of the patient. *Fibrous*

tumors also are developed within the organ, involving more or less granular tissue, adding to the constitutional trouble.

The symptoms which are developed are slowness and difficulty in making water, weight in the perinæum, and tenesmus. The bladder becomes irritable, with frequent urination. The projection formed by the tumor prevents all the urine from being voided, a portion remains behind, decomposes, and becomes ammoniacal. Sometimes there is complete retention, with its attendant troubles; at others, the mucous coat of the bladder, irritated by the alkaline urine, inflames, and secretes a viscid mucus; and finally the kidneys become disorganized, the ureters dilate, and the urine continually dribbles away, and the patient dies exhausted. During the manifestation of these phenomena, the constitutional symptoms become more and more marked, fever, sweats, painful micturition, sleeplessness, and constant urinary irritation wear away the life of the sufferer. Physical examination per rectum will reveal the nature of the trouble.

Treatment. — *The urine, if possible, must all be removed from the bladder several times a day by a prostatic catheter. Squires' vertebrated catheter is highly recommended for this purpose.*

The medical treatment consists in the use of one of the following remedies, according to indications: *Agnus cast.*, *Apis*, *Alum.*, *Cyclamen*, *Copaiba*, *Dig.*, *Caust.*, *Hepar*, *Lyc.*, *Puls.*, *Secale*, *Selenium*, and *Sulph. acid.* The *Iodide of Potash*, *Iodine*, *Puls.*, *Calc. carb.*, *Sil.*, *Thuja*, and *Sulph.* exercise a curative control if given early. (See "Special Indications," below.)

SPECIAL INDICATIONS.

Aconite. — With great urging to urinate; great pain in micturition, or in milder cases when there is great pain in walking, especially going down stairs.

Aloes. — Sensation as if a plug was wedged between the symphysis and coccyx, pressing downward; incontinence of urine from enlarged prostate.

Apis Mel. — Excessive pain in vesical region; frequent desire to urinate; pressing down in the region of the sphincter; the calls to urinate are both day and night; severe pain in passing urine, as if some impediment prevented.

Causticum. — Pulsations in the perinæum; pain in urethra and bladder after a few drops have passed; spasms in the rectum, with renewed desire for micturition.

Chimaphila. — Sensation of swelling in perinæum when sitting down, sensation as if a ball was pressing against the perinæum; excessive itching and painful irritation of urethra from the end of the penis to neck of the bladder; prostatic disease, with waste of prostatic fluid; urine thick and ropy.

Conium. — Discharge of prostatic fluid on every change of emotion, with voluptuous thoughts, and itching of prepuce.

Copaiva. — Urine is emitted by drops ; burning and sensation of dryness in the region of the prostate gland ; induration of the prostate.

Cyclamen. — Drawing, pressing pain in the perinæum, and in and near the anus, as if a small spot was undergoing ulceration ; increased when walking or sitting.

Digitalis. — Fruitless efforts to urinate, or discharge of only a few drops of urine, and continued fullness after micturition ; throbbing pain in region of neck of the bladder during straining effort to pass water ; increased desire to urinate after a few drops have passed, causing the patient to walk about in great distress, although motion increased the desire to urinate ; frequent desire to defecate at the same time ; very small soft stools passed without relief.

Hepar. — Discharge of prostatic fluid after micturition and during hard stool ; also independent of either.

Iodium. — Swelling and induration of the testicles and of the prostate gland ; incontinence of urine in the aged.

Kali Bichrom. — Stitches in prostate when walking ; must stand still ; prostatic fluid escapes at stool ; painful drawing from perinæum into urethra ; after micturition, burning in back part of urethra as if one drop had remained behind, with unsuccessful efforts to void it ; stitches in urethra.

Lycopodium. — Pressing on perinæum near anus during and after micturition ; stitches in neck of bladder and anus at the same time ; urging to urinate ; must wait long before it passes ; incontinence of urine.

Oleum Sandal. With sensation of pain and uneasiness deep in perinæum ; desire to change position constantly to get relief ; stream small, and passed with hesitation ; sensation of a ball pressing against the urethra ; pain decreased when walking ; increased when standing some time ; heaviness in the feet in the morning when first rising from bed ; sexual powers weak ; erections feeble ; urine red and scanty. (Clinical.)

Populus. — Enlarged prostate ; painful micturition ; catarrh of bladder.

Psorinum. — Discharge of prostatic fluid before urinating ; frequent scanty urine, burning and cutting in urethra.

Pulsatilla. — Painfulness in the region of bladder ; frequent desire to urinate, dull stitch in the region of the bladder ; spasmodic pains in neck of the bladder, extending to pelvis and thighs ; fæces flat, of small size from enlarged prostate.

Selenium. — Prostatic juice oozes while sitting, during sleep, when walking, and at stool, causing a disagreeable sensation ; the same sensation is felt shortly before and after stool.

Staphysagria. — Frequent and copious urination ; burning in the whole length of the urethra, when urinating, for many days ; frequent urging, with scanty discharge of a thin stream of red-looking urine ; urging as if the bladder was not emptied ; discharge of dark urine by drops.

Thuja.—Syphilis and sycosis, especially suppressed or badly treated gonorrhœa; stitches in urethra from behind, also from rectum into the bladder.

Remedies Indicated for Special Symptoms.—Escape of urine involuntarily drop by drop: Arn., Bell., Mur. ac., Dig., Petr., Puls., and Sepia.

Difficulty in voiding urine; must press a long time before it flows: Alum., Apis., Hepar, Nuph., Sec., and Tax.

The stream of urine is small: Graph., Olean., Sars., Spong., Staph., Sulph., Tax., and Zinc.

Burning in the neck of the bladder while urinating: Cham., Nux., Petr., and Sulph.

After micturition, desire continues: Bar carb., Bov., Calc. carb., Caust., Dig., Merc., Ruta, Staph., and Zinc.

Impossibility to urinate: Dig., Sepia.

Continued desire to urinate: Amm. carb., Apis., Bell., Canth., Copaib., Dig., Iod., Merc., Mur. ac., Phos., Puls., Sep., Scilla, Sulph., and Thuja.

Pulsation in perinæum: Caust. Heaviness in the perinæum: Copaib. and Graph. In favorable cases, prostatitis ends in resolution. Badly managed cases suppurate, and abscesses extend and perforate into the rectum, urethra, or bladder, and discharge; other cases assume a chronic form, and by exudation, infiltration, and deposition of tubercles and cysts, produce a permanent enlargement.

SECTION VII.

Gonorrhœal Ophthalmia.

Gonorrhœal ophthalmia, or *ophthalmia gonorrhœica*, is an acute specific inflammation of the conjunctiva of the eyeball and lids, and characterized by a profuse discharge of yellow purulent matter, similar to that which issues from the urethra in gonorrhœa.

This disease is the most violent, rapid, and destructive to which the eye is subject. Frequently, when the patient applies for relief, the eye is irreparably injured; and, unless the course of the disease be promptly arrested, the eye will be lost.

In this form of ophthalmia, as also in the purulent or contagious variety, there is great danger that the conjunctiva will swell extremely and overlap the margin of the cornea, and lead to its sloughing, apparently by strangulation of the vessels by which it is nourished. When this condition occurs, it is called *Chemosis*.

Cause.—The disease arises from the accidental contact of gonorrhœal matter with the eye, and not, as some have supposed,

from a metastasis of the disease from the organs of generation to the eyes. In this way, the matter may be accidentally applied to the eye of a healthy person through the medium of cloths, towels, etc. Even children are sometimes thus contaminated. The disease presents symptoms similar to those of purulent ophthalmia, and to that disease affecting infants.

The disease is usually confined to one eye; if the other be diseased, it is because there has not been sufficient care to prevent inoculation.

Treatment.—Use *Acon.*, *Arg. nit.*, *Merc.*, *Bell.*, *Sulph.* Additional remedies are, *Sulph.*, *Sil.*, *Puls.*, *Lyc.*, *Aur.*, *Rhus*, *Spig.*, *Tussilago pet.*, *Thuja*, *Macrotin*, and *Euphorbin*. (See, also, "Leading Indications for Ophthalmic Medicines," below.)

LEADING INDICATIONS FOR SOME OPHTHALMIC MEDICINES.

Belladonna. — Pain, redness, and swelling; throbbing pain in the temples or eyes; flushed cheeks, glistening eyes, and great intolerance of light. One or more drops of the remedy may be mixed with half a dozen tablespoonfuls of water, and a teaspoonful given during the acute stage every hour, and afterward every three to six hours. Belladonna is often required when there are general feverish symptoms; or, a few doses of Aconite may precede Belladonna.

Aconite. — Ophthalmia, with quick pulse, dry skin, thirst, and when arising from cold. The early administration of this remedy, with the local use of compresses, will generally promptly relieve and cure catarrhal ophthalmia. For gonorrhoeal ophthalmia, Dr. Angel recommends it every hour, with the topical application of ice, or iced water, and Aconite during the first stage.

Mercurius Sol. — Ophthalmia marked at first by a copious discharge of watery fluid, which afterward changes to mucus and pus; agglutination of the lids; smarting heat and pressure, with aggravation of the pains when moving or touching the eyes. There is considerable itching and irritation, but not much fever present.

Mercurius Cor. — In the most violent forms of acute ophthalmia, with extreme dread of light, or in chemosis, the 1st or 2d dec. att. of this remedy will often cut short the attack.

Euphrasia. — Catarrhal ophthalmia, with profuse secretion of tears, sensitiveness to light, stinging as from sand, and catarrhal inflammation of the frontal sinuses and of the lining of the nose. In simple catarrhal inflammation, profuse lachrymation being the chief symptom, it often cures without the aid of any other remedy. In severe cases it may be applied locally.

Argentum Nit. — This remedy is especially valuable in the purulent ophthalmia of children, which it cures rapidly and completely, without the local use of the nitrate. It is also valuable in chronic ophthalmia. Dr. Dudgeon highly recommends it as homœopathic to gonorrhoeal ophthalmia; two to

four grains to an ounce of distilled water; a small quantity of the solution to be introduced under the eyelids with a camel's-hair brush once a day, or every two, three, or four days, according to the symptoms.

Phytolacca Decandra.—Itching in the eyes, aggravated by gaslight; chronic conjunctivitis, and rheumatic pains; reddish-blue swelling of the lids.

Arsenicum.—Obstinate ophthalmia in weak, nervous patients, particularly if the secretion be acrid, with burning, tearing, or stinging pains in the globe and lids, aggravated by light; paroxysms of pain; violent stabbings in the eye; eyeball feels like a globe of fire.

Phosphorus.—Chronic and obstinate cases which have resisted the usual remedies, with sensitiveness to light, heat and itching of the eyes, sudden attacks of blindness, black spots floating before the eyes, and secretion of viscid mucus.

Nitric Acid.—Purulent ophthalmia; swelling and redness of the mucous membrane and lids; secretion of viscid mucus or pus; burning and smarting in the eyes; photophobia; nightly agglutination; and pains in the bones and parts around the eyes. Nitric acid is required in cases originating in syphilis, or aggravated by Mercurial preparations.

Gelsemium.—Squinting; desire for light; orbital neuralgia.

Pulsatilla Nut.—Eyelids agglutinated; increased secretion of tears; neuralgic pains in the eyeballs.

Hepar Sulph.—Similar cases to Nitric acid, which it may follow, if necessary.

Arnica.—Inflammation affecting either the mucous membrane or the deeper structures of the eye, from mechanical injuries. In addition to its administration, the eye should be bathed with a lotion of Arnica (twelve drops to four tablespoonfuls of water). After well bathing the eyes, a piece of lint or linen should be saturated with the lotion, applied to the eye, covered with oiled silk, and secured by a handkerchief.

Accessory Measures.—Assiduous bathing, fomentations, hot medicated water compresses, etc.; astringent *collyria*, and sometimes surgical measures, are employed. In the treatment of the various forms of ophthalmia, with weak and imperfect vision generally, the causes of the disease should be correctly ascertained, so that they may, as far as possible, be guarded against or removed. Patients in crowded and unhealthy towns should resort to the country, at least for a time, where they may take daily out-of-door exercise, and enjoy a pure, bracing air. Frequent careful tepid washing of the eyes to prevent accumulations of matter; the occupation of a spacious, well-ventilated apartment; and avoidance of all causes likely to keep up the inflammatory process, are necessary precautions. The food should be plain and nourishing, coffee and fermented drinks being excluded; the habits early and regular; and frequent bathing

should be practiced. A small *wet compress*, covered with oil-skin or India-rubber, worn over the nape of the neck, is a valuable counter-irritant when the more violent inflammatory symptoms have been subdued; it is also useful in obstinate cases. The alum curd poultices I have used with good results.

SECTION VIII.

Gonorrhœal Rheumatism.

Gonorrhœal rheumatism differs from ordinary rheumatism in that it follows one or more attacks of gonorrhœa. It has pain, swelling, weakness, and rigidity of the *larger* joints and overlying muscles. The knee-joint is most frequently attacked; motion increases pain; the affected parts are inclined to become cold, are sensitive to damp and changeable weather; fever and pain are not so marked as in ordinary arthritis; generally occurs toward the decline of gonorrhœa. Attacks in preference young people of a delicate, strumous habit.

Treatment.—The remedies are: *Acon.* or *Gels.* in the first stage; subsequently, *Bry.*, *Clem.*, *Kali iod.*, *Kalm*; aggravated by motion, *Mezer.*, *Sarsap.*, *Sulph.*, *Thuja*, *Cimicif.*, *Euphorb.*, *Rhus*, *Sep.*, *Stram.*, *Verat.*, and *Phytol.* The hot springs of Arkansas are highly beneficial.

SPECIAL INDICATIONS.

Aconite.—During febrile disturbances; when the large joints are affected, with little rigidity; when the heart is attacked, with congestion and a sense of anguish; in rheumatism of the shoulders.

Bryonia.—When the lower limbs are affected; severe pains in the joint; heat and dryness of the parts; severe pains shooting down the limbs; shining, red swellings; greatly increased by motion.

Arnica.—Stiffness in the large joints; tearing pain in the smaller joints, with a tearing, bruised sensation.

Causticum.—In rheumatic swellings and stiffness of joints; enlarged joints with topi; contraction of tendons; shooting and tearing pains, especially in chronic cases and scrofulous patients.

Cimicifuga.—Local forms of rheumatism, with muscular implication; heart affections; wandering pains.

Rhus Tox.—When sheaths of tendons and muscles are most affected, tightening, lameness, tearing, bruised, and sprain-like pains in the larger joints; aggravated at night by the warmth of the bed, or when beginning to

move after rest; lessened by gentle and continued motion; chronic thickening of joints; affection of periosteum.

Rhododendron. — Pains worse during rest, in the warmth of the bed, and with every unfavorable change of the weather, especially when easterly winds prevail; swelling and redness of both large and small joints; tension and rigidity.

Pulsatilla. — When ankle, instep, or knee is affected; fugitive pains in various parts of the body; pains moving from one point to another, especially in females with menstrual irregularities.

Mercurius. — Puffy swelling of joints; pains deep-seated in the bones or joints, increased by warmth and at night; profuse perspiration, which does not give relief.

Phytolacca. — Chronic cases, with swelling and stiffness of joints, even to loss of motion in the limb; when periosteum is implicated. (Consult Guaiacum and Mezereum.)

Sulphur. — After remedies when improvement halts; to complete the cure begun by another remedy; hereditary taint, or when associated with eruptive disorders.

Ledum. — Rheumatism of small joints, fingers and toes; chilliness.

Dulcamara. — Rheumatism from exposure to wet, changes of the weather from dry to damp increases pains; relieved by rest.

Colch., *Coloc.*, *Bell.*, *Kali bichrom.*, *Ranunc. bulb.*, *Mang.*, may be advantageously employed as accessories.

Rheumatic patients should always wear flannel and warm clothing to guard against atmospheric changes. Protect the feet from cold and damp. Occasionally, warm salt-water, vapor or hot-air baths, are very useful. Diet should be easy of digestion, and all condiments be avoided.

SECTION IX.

Gonorrhœa in Women.

Gonorrhœa in women is a much less formidable disease than in men, arising from the fact that the parts inflamed are comparatively less sensitive, more expanded, and structurally more simple.

The *symptoms* are much less acute than in males, and it is much more apt to degenerate into a chronic gleet. Complications are bubo, and ulceration of the neck of the womb. The discharge may proceed from either the external parts; the labia, nymphæ, meatus urinarius, vagina, or from the cervix uteri.

When it involves the cervix, it will be associated with superficial ulceration. Differentiate carefully between it and leucorrhœa, and the various discharges that follow simple derangement of the uterus and urethra. Verminous affections produce purulent discharges of the vulva in young girls. The presence of urethritis, accompanied with acute inflammation, is the strongest symptom of gonorrhœa. There is frequent desire to pass water. The speculum should be employed in all doubtful cases.

It occurs under four forms, gonorrhœal *vulvitis*, *urethritis*, *vaginitis*, and *uteritis*.

Symptoms.—There is urgent desire to pass water; heat; burning, swelling, and discharge, muco-purulent and offensive; attended with swelling and irritation of the clitoris; the mucous membrane is reddened and tumefied, with high inflammatory action.

G. Vulvitis.—This form attacks the external organs of generation; the symptoms are heat and pruritus; the mucous membrane is of a deeper red than usual, moist and slightly swollen; and it is followed by scalding on urinating, bearing-down pains, and a feeling of weight in the external genitals. The discharge at first is albuminous; assumes soon a purulent character; irritating and offensive, which occasionally gives rise to nymphomania, a most distressing complication. Small abscesses sometimes form in the vicinity of the vulvo-vaginal glands.

G. Urethritis.—This is rarely met with in the female as a distinct affection; it is associated with vulvitis. It is indicated by a burning urethral pain, intensified during micturition; the discharge is slight; lips of the meatus, red, swollen, and painful. The finger introduced per vaginam, detects a thickening of the urethra; upon pressure against the pubic arch, it feels like whipcord; abscesses sometimes form in the vagina and perinæum, and the glands of the groin enlarge and suppurate.

G. Vaginitis.—This is the most frequent seat of the disease, the membrane looks red, is hot, and devoid of moisture; itching, smarting pain exists, with frequent micturition; the vagina feels hot and puffy, and soon there exudes a large quantity of yellow, or greenish, muco-purulent matter. In a few days the discharge diminishes, and the disease becomes chronic and difficult to cure.

The anterior half of the vagina, immediately under the arch of the pubis, is the part most affected, which presents an aphthous appearance when examined with the speculum.

G. Uteritis.—Vaginitis extends sometimes to the internal surface of the uterus, when it becomes a severe disease, and difficult to manage. The ovaries may become implicated, the general health undermined, and the reproductive processes interfered with. The os becomes excoriated, the uterus congested, and there exudes from it a gleety, whitish matter, offensive, and at times quite abundant. The diagnosis between it and leucorrhœa can only be made in some cases by inoculation.

Treatment.—For vulvitis, *Acon.* and *Merc.*, in the acute stage; *Thuja* and *Sulph.*, in its chronic form. For vaginitis, *Acon.*, *Bell.*, *Merc.*, and *Puls.*, in the acute form; *Sepia* and *Creosote*, in sub-acute varieties. For urethritis, *Acon.*, *Cann.*, and *Canth.*, in the active stage; and *Copaib.*, *Petros.*, *Cubeba*, and *Sulph.*, in the chronic. For uteritis, *Acon.*, *Canth.*, *Nit. acid*, and *Merc.*, for the acute type; *Sepia*, *Plat.*, and *Alum.*, for the sub-acute. Great cleanliness, warm fomentations, and medicated lavements of *Alum.*, *Hyd.*, *Tannic acid*, and *Borax*, will be found very serviceable during treatment.

The treatment is the same as that recommended for the male. Frequent ablutions and injections should be employed. The vagina should be well distended with the injection. This is an important auxiliary in the treatment, and should be insisted upon. The fountain syringe and the vaginal douche is one of the best instruments for the purposes of injection. Hip baths are valuable auxiliaries. The temperature should be regulated according to the feelings of the patient. Hygienic measures should be rigidly enforced, and sexual congress prohibited for at least ten days after all evidence of the disease has passed away.

CHAPTER III.

Chancroid.

CHANCROID is the simple, soft, non-infecting sore, or local contagious ulcer, unaccompanied by any prominent or perturbing influences in the system. The recent developments of the

disease, and the present unsatisfactory condition in which its kind disorder, *chancre*, is held by those who have abundant means of observation, and the many theories propounded in reference to its course and effects, are evidences of the still undetermined nature of the disease, and the progress made toward a keener realization of its true character.

Pathology.—The period of incubation is short, say from twenty-four hours to the third day after infection. It begins as an ulcer, which develops immediately after absorption of the poison. Its shape is round or oval, and only becomes irregular from the fusion of multiple pustules; the edges are clean cut, perpendicular, often everted and undermined; it is seldom single; is rarely present except on or near the genitals; is of a yellowish color, with a reddish areola around the sore; is auto-inoculable, and is situated in the sulcus between the prepuce and the glans, and at the sides of the frænum. (Fig. 160.) The germ of the chancroidal virus having been deposited upon the exposed surface, the work of local destruction begins at the moment of its contact. The base of the ulcer is soft, and can be easily compressed between the fingers. The discharge from the surface contains pus globules, or degenerate leucocytes, mixed with the debris of the tissues. The lymphatic glands in the groin soon become involved, inflame, and generally suppurate; but the system does not become infected. Therefore, no constitutional symptoms occur. Uncomplicated chancroid soon gets well, and the only result is a trifling local scar: malignant chancroid, on the other hand, is attended by serious complications, but it never produces syphilis. The damage it produces is purely local; by its severity and extent, it may lead to distressing results, such as phimosis, the complete closure of the meatus urinarius, an opening into the urethra, or stricture of the rectum; but these consequences are exceedingly rare.

Fig. 160.



The Bubo of Chancroid.—The term *bubo* is no longer confined to enlargements of the inguinal glands, but is applied to all swellings of lymphatics in any part of the body, when the immediate cause is a recent venereal ulcer.

I shall divide *bubo* into four varieties; viz., the *simple*, the *indolent*, the *virulent*, and the *spontaneous*. The three former are

of the venereal type: the latter may be produced by a strain, cachexy, local injury, or indolent ulcer on the leg. Rarely the sore spreads deeply and rapidly, and this only when Mercurialization has been produced, or when a peculiar constitutional dyscrasia exists in connection with the chancroid.

About two-thirds of all chancroids remain purely local, the other third is attended with bubo, which may be either inflammatory and resolve itself, or indolent and suppurate. The term bubo I shall apply to enlargement of any lymphatic gland in the body, having for its immediate cause a recent venereal ulcer. It is more common in men than in women; and in strumous, lymphatic constitutions, rather than in those of a vigorous type.

The Simple Bubo.—In the simple bubo, as a rule, only one gland is affected; it occurs early, within a week or two after the chancroid is developed. It begins with a sensation of stiffness in the groin, is sensitive to pressure, and painful from walking and ascending stairs. The pain keeps pace with the increasing enlargement; it becomes red and œdematous, and soon a central soft spot appears, indicating suppuration; and, if left to itself, it opens and discharges.

The Indolent Bubo.—The indolent bubo occurs in impaired constitutions; it grows slowly, involves the neighboring lymphatics, and all become matted together by inflammatory changes into a compound tumor. Increasing in size, it presents a livid, shining, dead hue, sometimes smooth, œdematous, and increases to the size of an egg, occupying the folds of the groin. Its course is variable: at times it becomes peri-glandular, when it opens through the skin with one or more small perforations, which discharge a small amount of sanious fluid, containing a few pus corpuscles. The glands do not break down; but the discharge may continue for months, and even years, if not attended to, leaving rigid fistulæ to discharge interminably.

The Virulent Bubo.—The virulent bubo is a subcutaneous chancroid, and is a violent form of the indolent type, and, when opened to the air, its true chancroid characters begin to appear. The cut edge of the skin is immediately inoculated, and the whole cut border ulcerates, and the opening grows larger by being eaten away by the advancing ulceration. The borders of the ulcer become hard, livid, and undermined; the integument adjoining the ulcer assumes a dusky, purplish hue, and sloughs away. The floor of the abscess is uneven, pultaceous, irregular,

worm-eaten, and discharges an ill-conditioned pus, inoculable upon the sufferer. It has all the appearances of a true chancre, and is subject to all the conditions and complications to which a chancre is liable. Phagedæna may attack this kind of bubo in either the sloughing or serpiginous form, the latter of which is the most common. Its course usually is upward over the abdomen, destroying the connective and cutaneous layers down to the deep fascia, sweeping away everything except the glands, leaving a raw, ulcerated spot in the groin and over the abdomen as large as the hand.

The Spontaneous Bubo.—This is a simple lymphangioma, arising from a strain, fatigue, struma, cachexy, local injury, etc., and has no connection with either chancre or chancreoid. Its accidental position in the groin only gives it interest in a differential point of view from the general bubo of the chancreoid ulcer.

Treatment.—Local treatment consists in touching the ulcer in the early stage, or pustule when first discovered, with strong Nitric acid, and in light dressings of *Calend.*, *Acid nit.*, or *Hydrastis*. The constitutional remedies are: *Acid nit.*, *Acid carbol.*, *Ars.*, *Caust.*, *Merc.*, *Carbo veg.*, *Cinnab.*, *Kali bi.*, *Lyc.*, *Phos. ac.*, *Sepia*, *Sil.* If the inguinal glands become inflamed, they must be treated the same as inflammation of glands under other circumstances, by hyper-distention, etc. Whenever the system is impaired by any cause, attention should be given to its reinvigoration and support. If any complications arise, such as phagedæna, or any of its varieties, which is rare nowadays, good results may be obtained by the internal use of *Arsenicum*, *Carbo veg.*, *Bromine*, *Kali chlor.*, *Graphites*, *Nitric* and *Sulphuric acids*, *Stillingia*, *Tartar emet.*

Treatment of the Simple Bubo.—The simple bubo may frequently be aborted by rest, antiphlogistic regimen, vesicants, or irritants to the skin, such as a mild tincture of Iodine, poultice of horseradish, local application of Chloroform, pressure applied to the gland, the tincture of *Aconite* or *Belladonna*, applied to the part several times a day with a camel's-hair brush. The two latter I have found more efficacious than either of the preceding remedies. Hot applications are much preferable to cold as an abortive agent. *Hepar sulph.* or *Mercurius*, given internally, with either the *Aconite* or *Belladonna* application, I have seldom been disappointed with. If the bubo put on a decided inflammatory

type, Aconite is the better remedy; but, if the gland possess more of a congestive character than inflammatory, Belladonna is my favorite local agent for aborting the growth.

If, in spite of all our remedies, the bubo goes on to suppuration, my plan is to evacuate the contents of the abscess with a fine aspirator needle; and, after throwing into the cavity a syringe-ful or two of equal parts of the tincture of Calendula and water, withdraw the needle, and apply firm pressure over the gland. When two or more glands were involved in the inflammatory process, and the parts were highly inflamed, red, and painful, I have used a poultice, applied as *hot* as the patient would permit, of ground flaxseed, or elm bark, moistened with either Aconite or Belladonna, according to the severity of the inflammation. As soon as the slightest degree of pustulation is discovered, open freely, and let out the discharges, and treat as before indicated. In making an opening into the abscess, let the direction of the bistoury be along the fold of the groin; if bleeding should be in excess, touch the oozing surfaces with the liquid Persulphate of Iron, and apply wet dressings of Calendula lotion, retained in position by the crossed bandage of the thigh. Change frequently, and see that the parts are kept perfectly clean. Cut off all the hair in the vicinity of the inflamed gland, to avoid accumulating filth, and treat as a simple abscess.

Treatment of the Indolent Bubo.—This variety of bubo cannot be aborted so readily as the simple kind; although I have succeeded in entirely cutting short the inflammatory process, by saturating a pledget with *Belladonna* lotion, applying it to the enlarged gland, and placing over it a strong, unyielding hernia truss, keeping up the pressure externally; while *Hepar sulph.* or *Mercurius sol.* is given internally, to counteract the formative processes of suppuration. The dry sponge, applied firmly to the part, and moistened with Belladonna lotion, has also proved valuable in my hands. I have employed the strong tincture of Iodine as a derivative, but with little success. The skin becomes dark, cracks, and becomes sore; then little good can be accomplished by the external use of Iodine. Keys endorses highly "the punctuate cauterization, applied with Paquelin's thermo-cautery. The platinum point is first brought to a white heat, kept at that point of temperature, and rapidly touched upon the skin over the tumor, at twenty to fifty different points, according to the size of the lump." The pain produced by its application, and the moral

effect upon the patient, is enough, I think, to debar any extended observations in this direction, when such gentle curative agencies as those given above, are at hand. If the abscess is large, and suppuration exists, it should be opened, its contents be evacuated, and treated like an indolent abscess in other parts of the body. The local applications above mentioned, with the internal administration of one or more of the following remedies, will be found ordinarily sufficient for the cure of the worst cases: Arsenicum, Mercurius cor., Cinnabar, Mercurius jod., Nitric acid, Kali jod., Kali bichrom., Graphites, Hepar sulph., Carbo veg., Lachesis, Silicea, Sulphuric acid, and Thuja. They may be selected according to the *special indications* given below.

Treatment of the Virulent Bubo.—The virulent bubo should be treated differently from the preceding, from the fact of the threatening suppuration, which advances with considerable rapidity. Any erosion or abrasion of the skin will furnish fresh foci for inoculation with the discharged pus. Hence prompt action should be had, and the gland opened, by a long, free incision; the sooner the better. It is advised, that the integument be divided from without inward, and the suppuration be permitted to discharge freely. In certain cases it is recommended, if the suppuration is peri-glandular exclusively, to remove the gland at once unopened. The cut edges will take on the ulcerative action, and a large, open, virulent chancroid will be formed. Here cleanliness will accomplish much, and attention must be given to the administration of such remedies, internally, as will antagonize the chancroidal virus, promote the healing process, and establish the cure. The applications recommended in the indolent variety will accomplish much here. The general detail of treatment will correspond with that of ordinary chancroid.

SPECIAL INDICATIONS FOR THE THREE VARIETIES OF BUBO.

Nitric Acid.—This may be used when Mercurius has been employed without any benefit; when the ulcer is ragged, painful, and disposed to spread. It is a formidable antagonist to chancroid, especially in strumous, cachectic, or impaired constitutions; raised edges; bleeds easily; granulations pale, flabby, prominent. It gives splendid results applied locally.

Arsenicum.—In indurated buboes with gangrenous edges; florid and elevated granulations: the margins bleeding at the slightest touch; the discharge thin and offensive; the margins are jagged, sharp, undermined, and livid; intense burning pains; gangrene threatened, with a livid or mottled appearance of the sore, and the formation of a black slough; falling-off of the hair and nails.

Kali Jodatum. — In scrofulous constitutions after *Mercurius* and *Nitric acid* have been tried unsuccessfully; the ulcer is hard, indolent, and suppurating with difficulty; the discharge is curdy, discolored, and foul smelling, especially if the spermatic cord is thickened and painful.

Lachesis. — When there is considerable prostration: the parts are extremely livid and mottled; in phagedenic ulcer, gangrenous ulcers and blisters; the sore is flat and spreading.

Belladonna. — Large and painful buboes, with congestive type of inflammation; the skin is of a deep red color, disappearing under pressure, and returning slowly after the finger is removed; phlegmonous inflammation extending to adjacent parts.

Causticum. — In buboes secreting an acrid, corrosive pus, with systemic complications, such as scurvy and gout; chancroid, with disposition to fungous growths; patients subject to cutaneous eruptions.

Sepia. — Indolent chancroids, with burning itching, humid or scurfy herpes about the parts; eruptions extending to the glans and prepuce.

Phosphoric Acid. — Buboes with raised edges; granulations pale and flabby; margins of sore thick, rounded, and prominent; corroding, itching herpes on the prepuce; heat, burning, and soreness when sitting or walking; nocturnal pains in the bones, as if they were scraped with a knife.

Phytolacca. — Inguinal glands inflamed, swollen; ulcers appear as if parched out; lardaceous bottom, with general weakness and prostration.

Local Treatment. — A solution of *Chloral Hydrate*, ten parts to one hundred parts of water, is an excellent topical application in the simple and indolent varieties of bubo; but it fails to produce much good in the virulent form.

Phytolacca dec. I have employed this in obstinate cases of indolent bubo, when all other remedies of the first class had failed.

Carbolic acid. A weak solution of Carbolic acid, applied locally, is highly recommended.

I have frequently tried Ricord's great and vaunted remedy, which he styles the "born enemy" of phagedæna, in those violent forms of the virulent bubo, with good results. I believe it will accomplish more good than the caustics in ordinary use, such as the Vienna paste, Potash, and the actual cautery. I have employed it prepared as follows; viz.: *Ferri et Potassæ tart*, half an ounce; water and sirup in equal quantities, each three ounces. Of this I have given one teaspoonful three or four times a day. It can be employed as a topical application as well, and certainly possesses remarkable virtues in checking the disease, and restoring the ulcerated surfaces to a more healthy condition.

Chromic acid has been successfully employed by Dr. T. G. Comstock, of St. Louis, Mo., who claims that it possesses highly

curative powers in the more virulent forms of bubo. He says he has cured in thirty hours the most intractable ulcers of this class, that resisted all previous efforts; he succeeded perfectly, not only in thwarting the spread of the ulcer, but changed its phagedenic and ill-conditioned character to that of a healthy granulating surface. It certainly deserves an extended trial, vouched for as it is by the authority above mentioned.

The frequency with which local applications are to be renewed, depends upon the quantity and character of the secretions. Cleanliness should be rigidly enforced, and the patient should be allowed a wholesome, generous diet. Due attention should be given to hygienic influences, and the patient be placed under the most favorable conditions of health.

CHAPTER IV.

Syphilis.

THE recent investigations of syphilis, a disease hitherto so much dreaded, have proven its present mildness as compared with the former virulence that marked its existence. Mr. Keys speaks of it as "a disease of magnificent exceptions, full of absorbing interest;" and Professor Dana says, "that the disease is not so virulent now as it was during the century when it first conspicuously appeared;"* and all authors agree that its severity, from some *cause*, has abated. To what is this cause attributed? To my mind the answer is, that the widespread dissemination of the disease throughout the world, and the almost universal prevalence of its hereditary characteristics, have established an immunity from its severe attacks, just as vaccination, wherever practiced, has given protection from the heretofore deadly ravages of small-pox. This, coupled with the fact that professional men have been gradually lessening the poisonous quantities of Mercurials given to cure the disease, has, in my opinion, done very much to strip this disorder

Fig. 161.



* Professor Charles L. Dana, on the "Benignity of Syphilis."

of the horrors with which it was associated during the reign of the crude, destructive doses of Mercury. It is true that the *type* of the disease, whenever manifested, proves that its nature has not changed, its features have not altered; but its sting has become less virulent, and, consequently, less dreaded. There is no question of the fact, that of all people, occupations, or trades, there are none in whom the manifestations of syphilis would be more prominent, its characters more universally displayed, than in the seamen of this and other countries. Yet we observe among this class such a mildness in syphilitic attacks, such exemption from the virulence of the past, such an immunity from its constitutional characteristics, that we are forced to accept the doctrine of its growing moderation, and agree with Professor Dana, (1) that syphilis, as a rule, runs a very mild course indeed among American seamen, and physically incapacitates them less than either soft chancre or gonorrhœa, with their complications and sequelæ; and (2), that it runs this course often without treatment, and almost always in spite of irregular living and unhygienic surroundings.

The initial lesion of chancre begins as a papule, generally single, or an erosion with indurated areola; it either remains to the end, or the papule bursts, resulting in an ulcer with a hardened base.

The virus has a lengthened period of incubation (fifteen to twenty-five days) before development of the papule. It is usually circular; its edges are smooth, not undermined; often elevated and adherent, and gradually melt into the shining floor of the ulcer. It may exist on any part of the body, but more frequently on the genitals. Its secretion is scanty, and serous in character, unless irritated, when it assumes a purulent form. It is not auto-inoculable. One attack exempts from subsequent invasion. It is peculiar to man, is seldom phagedenic, and shows little disposition to spread; is slow in development, but heals rapidly when once reparative action begins. The affection of the inguinal glands is usually *painless, multiple, and rarely ends in suppuration*, unless due to extraneous causes. The disease, though at first manifesting local trouble, may become constitutional, and then the person can never be inoculated with the virus of the chancre. "The proportion of chancre to chancreoid is about one to three," says Dana, in his reported tables of the U. S. Marine Hospital service; and, according to the tables of Dr. King, the mortality from syphilis was one-fortieth

of one per cent. From a return to the House of Commons of all the deaths from syphilis in the *workhouses* in England and Wales, beginning in the year 1875, there are only eight per million.

DIFFERENTIATION BETWEEN TYPICAL CHANCROID AND CHANCRE.

CHANCROID.

1. Nature and Cause. — *A local tissue disease, caused by contamination with chancroid pus in sexual intercourse; auto or hetero inoculation of chancroidal pus.*
2. Situation. — *Upon the genitals or in the groin; very uncommon elsewhere.*
3. Number. — *Often multiple, both in origin, and by spontaneous auto-inoculation.*
4. Second attack in same individual *entirely possible.*
5. Auto-inoculability. — *Always possible in generations.*
6. Transmissible to animals. — *Possible.*
7. *Begins as a pustule or an ulcer, and so remains; advances rapidly; heals slowly; no incubation.*
8. Color. — *Dirty yellowish white, or pinkish, with free creamy secretion.*
9. Induration *absent*; edges perpendicular; floor *uneven and dull, with pain.*
10. Phagedæna, *an occasional complication.*
11. Bubo *occurs in about one-third of all cases, either simple or virulent, and painful as a rule.*
12. *No appreciable constitutional contamination.*
13. *Syphilis, as a result of chancroid, impossible.*
14. *Local treatment all important.*
15. *A chancroid may be cured by cauterization without, and not produce consequent trouble.*

CHANCRE.

1. *A general blood disease, caused by contamination with syphilitic virus in sexual intercourse; hetero-inoculation of the chancre virus upon a non-syphilitic person.*
2. *Upon the genitals; not unfrequent upon the lips, nipples, and fingers; very uncommon elsewhere.*
3. *Generally single; sometimes multiple from the start; not usually spreading by spontaneous auto-inoculation.*
4. *Almost impossible.*
5. *Impossible, unless the ulcer secretes pus.*
6. *Quite probable.*
7. *Begins as papule, or an excoriation, and remains an indurated ulcer; advances slowly; heals quickly; has a distinct incubation from 5 to 20 days.*
8. *Livid red or bright blood color, or gray, with scanty, serous, sanguinolent discharge.*
9. Induration invariably *present*; edges *slanting and adherent, with smooth, bright floor, and painless.*
10. *A very rare complication.*
11. *Invariable, and always indolent, exceptions two per cent of all cases; never becomes virulent; painless as a rule.*
12. *Constitutional contamination occurs as a rule.*
13. *Syphilis, as a result of chancre, is invariable.*
14. *Local treatment unimportant.*
15. *Chancre cannot be cured by cauterization, and not produce constitutional implication.*

Treatment.—The remedies which are most successful in curing this disease, are the following: *Ars. iod.*, *Aurum.*, *Badiaga*, *Carbo an.*, *Carbo veg.*, *Cinnabar*, *Corydal.*, *Kali bichrom.*, *Kali hyd.*, *Lach.*, *Lyc.*, *Merc. cor.*, *jod.*, and *sol.*, *Nitric acid*.

The most important of all these remedies are the Mercurials; and, if we examine into the pathogenesis of *Mercury*, we will find that no remedy possesses such a closely related simillimum to syphilis. It is upon this very *Homœopathic* principle, as Dr. Bumstead reproachfully says, "that the elastic principle of *similia similibus* is also made to cover" the true curative action of this disease. This "*elasticity*" proves the essential element of the Homœopathic law, and its engraftment upon Allopathic practice "covers" all that is valuable in that system in the cure of syphilis. With all due deference to some of our friends, who seem better versed theoretically than practically in the treatment of syphilis, I believe, as I have oftentimes asserted, that the Mercurials, as a rule, are the only really reliable remedies for the cure of the indurated chancre; and it is through this remedy, properly administered, and diligently continued, that patients are dismissed "cured," without the necessity for their return to the surgeon, as has been sneeringly written by some who preach better than they practice.

Let us compare the effects of syphilis on the human system with the toxicological symptoms of *Mercury* as given by Pereira, in his famous *Materia Medica*, justly accorded as one of the very best works on that branch in the Allopathic school:

SYPHILIS.

Syphilis produces on the skin pustules, scales, and tubercles.

Excites inflammation of the periosteum, and caries of the bones.

Produces inflammation of the iris.

Produces inflammation and ulceration of the mouth and throat.

Produces enlargement and hardening of the glands.

Produces chloro-anæmia, a diminution of blood-corpuscles, and an increase in the proportion of serum.

Produces ulcers on the genital organs.

MERCURY.

Mercury, says Pereira,* produces severe forms of skin diseases.

Produces inflammation of the bones and periosteum, says Pereira.

A disease called Mercurial iritis.

Ulceration of the mouth and throat a well-known effect, says Pereira.

Produces enlargement of the inguinal and other glands, says Deterich.

Diminishes the coagulation of the blood, and increases the proportion of serum.

Produces ulcers, with induration, on the glans and prepuce, says Fick, of Hamburg.

* Pereira's *Materia Medica*, Vol. I., p. 588, *et sequitur*.

The difference between the two prevailing schools is simply this: that, while Homœopathic practice cures the disease "*tuto, cito, et jucunde*," Allopathy too often dooms the unhappy victim to all the attendant horrors of Mercurial toxæmia, which, according to Mr. Druitt's own confession, is *useless*, except to show that the system is affected. Professor Gross also remarks: "My own opinion is, that the more simple and gentle the Mercurial course is, the better." Professor Keys* says syphilis is "a self-limiting malady." Professor Dana† remarks that the disease is innocuous, as compared with its early history. Professor Keys states, that it gets well under all treatment, but yields best to *small doses of Mercury*, continued for a long time. Diday remarks that it is "cured by the grace of God:" that is the do-nothing treatment. Sigmund and Zeissl, two late German authors of high position, render their verdict in favor of Diday's method of treating syphilis. Keys says the question now is, how to use Mercury; and he settles the matter for the old school, and recommends what he terms the "tonic dose," which is one-half of the "full dose," viz., one-twelfth of a grain of the Proto-iodide of Mercury; and in *late years*, he has been in the habit of using a much less quantity; for instance, one equal to one-third instead of one-half of the "full dose," which is equivalent to one-eighteenth of a grain of the crude drug. With this diminished "tonic dose," he adds, that it is given "rather to his [the patient's] advantage; for he feels well under it in most cases; he eats well, his functions go on perfectly, and his blood is richer in red corpuscles than it was before." He also recommends that this dose shall be continued for about "three years," and "a year's freedom from evidences of the disease is desirable before the tonic is stopped." (This is good *similia* practice.) I mention these facts, gathered from recent and approved Allopathic authority, to show that the tendency in that school is to yield their old and cruel treatment of ponderable doses of Mercury, with all its multiplied horrors, to the minute and all-curative remedy of the recognized "elastic" *simillimum*. While these things are being done in the old school, to the credit and the relief of poor humanity be it said, I ask what is the position of our own syphilographers upon this important subject. The only two representative authors in the Homœopathic school

* "Venereal Diseases," p. 104.

† In a monograph on Venereal Diseases.

who have written late surgical treatises including the treatment of this disease, seem to be further from the mark, so far as an intelligent knowledge of the method of curing syphilis homœopathically, than those of our Allopathic brethren whom I have previously quoted. One proclaims his belief that the disease *can be cured*, but only by *material doses*, oft repeated, and recommends *Mercurials* to be employed in the *first trituration*; while the other declares that syphilis is "absolutely incurable," except it be "by the extinction of the sufferer, and the absence of any heirs of his body;" yet, in the treatment, the latter gives, most profoundly and most unerringly, "*full indications for remedies*," and adds, the "*Corrosivus* is the *sole simillimum*, so far as my [his] experience goes." How far does that experience go, when the true and "*sole simillimum*" yields up its curative powers, and negatively awaits the slow extinction of the sufferer? With all due deference to such authority, I still believe, as before stated, that *Mercurials* are the only real and reliable remedies in the treatment of the indurated chancre; and it is through this remedy, properly selected and judiciously given, that cases are being continually dismissed as "*cured*," without the necessity of coming again under the notice of the surgeon. I have "*cured*" hundreds of these cases, both in hospital and civil life, in a practice of nearly forty years, by the aid of *Mercurial* treatment, without imposing upon my patients the painful penalties of the remedy, or compelling their return for further treatment; and this I have accomplished by the higher potencies. I also believe, that, with the higher potencies, there is just as much certainty in "*curing*" this disease as any other affection in the nosology; and the longer I continue in the practice of prescribing for this disease, the more I am convinced that the higher potencies act the most promptly, the most certainly, and most curatively. As a rule, I employ the *Corrosivus* in persons of strong vital reaction, and the *Proto-iodide* or the *Solubilis* in those of scrofulous systems, dyscrasias, broken-down bodies, and in females. No disease at all equal to syphilis in obstinacy and virulence, yields a more ready response to the indicated remedy than this.

The *mixed chancre* of Rollet combines both the characteristics of chancroid and chancre. Each sore runs its distinct course, and the compound lesion possesses the peculiarities of both, and the treatment must be adapted to the combined characters. One may be cured before the other is fairly developed, when attention

must be given to the remaining sore. The mixed chancre is very rare.

Urethral chancre is one of the least common of all chancres, and is situated just within the meatus, one of the lips of which it may involve. It will be felt as a tumor along the course of the urethra, with pain on urinating and during erection. A slight discharge usually accompanies its presence, of a muco-sanguinous character. This may continue for three or four weeks, and there is some danger that the cicatrix may produce a stricture of greater or less importance. The inguinal glands also become affected as in the ordinary chancre.

Chancres in different parts of the body are to be treated in the same manner as those already spoken of.

The *excision treatment*, or rather the attempt to cure syphilis radically by excision of the chancre, is a recent and interesting method of effecting a cure of this disease, based upon the theory that "the poison, after being absorbed, lies latent locally throughout the period of incubation, and then commences to increase in quantity, at first locally." It is unnecessary to enter into a discussion upon a theory which is neither sustained by analogy or fact.

Auspitz, a German syphilologist of considerable repute, has attempted to prove the affirmative of the proposition; but, on close analysis, his statements are unsatisfactory and unreliable.

The inunction method, the vapor bath, fumigation by volatilization of Mercury, are dirty, unscientific, and dangerous plans of employing the Mercurial treatment; and no true Homœopath should be induced to try such crude and unsatisfactory measures, when the whole range of Mercurials, and their various attenuations are so easily obtained. A rule to guide us in the treatment of true syphilis is the condition of the floor of the chancre. If it exhibits a reddish, unhealthy appearance, or, if the color of the spot presents any strong contrast with the surrounding tissue, it is almost certain evidence that the constitutional disease is not completely cured. Treatment should be continued till the original base of the chancre is covered with healthy tissue, and no difference is perceptible between it and the contiguous structures. The practice, hitherto so strongly insisted upon, of destroying the chancre by the violent caustic preparations employed, cannot be too strongly reprobated. The destruction of the chancre in this way does not cure the disease already transmitted to the system: on the contrary, it removes a valuable guide in our treatment:

and there is no other way open to us whereby we can determine the condition of the patient, or the progress of the case. The appearance and characteristics of the spot where the chancre existed is the syphilo-meter, whereby we can safely and surely prognose the progressive recovery of the patient, or otherwise. When the caustic agents are employed to destroy the chancre, the systemic contagion becomes more intractable and complicated with the various conditions that develop during the progress of the disease. Confusing and complicating symptoms arise, making it difficult oftentimes to select the proper remedy; and the patient may finally succumb to "all the miseries of ill health," referable to his cruel treatment in the early period of his disorder.

One of the preparations of Mercury, given with reference to the constitutional and moral status of the patient, the form, extent, and duration of the ulceration, must be selected and diligently persevered in. The greatest cleanliness, locally and generally, should be insisted upon; dressings to the local sore enforced, and rest as far as possible enjoined. The following remedies, classified with reference to the progress and persistence of the disease, may be given according to their indications.

1. Primary Syphilis.—*Mercurius* (hard chancre); *Acid nit.* (Sloughing chancre, or if Mercury has been given to excess); *Merc. cor.* or *Cinnabar* (combined gleet and syphilis); *Thuja* (wartlike growths); *Bell.* (inflamed and painful buboes); *Ars. iod.* (buboes, painful, and threatening suppuration); *Phyto.*, *Podoph.*, or *Sulph.* (co-existing chancre and skin affections).

2. Secondary Syphilis.—*Acid nit.* and *fluor.*, *Eryng. aquat.*, *Merc.*, *Cundurango*, *Iodium*, *Kali chl.* (sore throat and mouth); *Merc. cor.*, *Kali hyd.* (iritis); *Aurum*, *Stillingia*, *Sarsaparilla* (rheumatic or bone pains).

3. Tertiary Syphilis.—*Kali hyd.*, *Aurum*, *Phos.*, *Acid. phos.*, *Sil.*, *Mez.*, *Asaf.* (nodes and bone diseases,—exostosis, caries, necrosis, etc.); *Ars.*, *Ars. iod.* (cachectic ulcers); *Aurum*, *Kali bichrom.*, *Calc. carb.*, *Kali chlor.* (ozæna); *Aurum*, *China*, *Phos.*, *Carbo. veg.*, *Ars.* (syphilitic cachexia.)

4. Hereditary Syphilis.—*Merc.*, *Nit. ac.*, *Aurum*, *Phyto.*, *China*, *Ars. iod.*, *Sulph.*, *Iodium*.

SPECIAL INDICATIONS.

Mercurius Sol.—This remedy stands in the front rank among the few that are capable of destroying the venereal poison in the system. Its pathogenesis contains nearly the entire phenomena resulting from venereal infec-

tion. It is of special value in primary symptoms, and in inherited syphilis of infants and children. Dr. S. P. Hedges, of Chicago, Ill., has found, that, whenever it fails to cure, the diathesis of the patient is complex; so that no one remedy will alone effect a cure. It is especially indicated in Chancre with *red edges*, cheesy or lardaceous bottom, *painful*, and readily bleeding. Chancre with indurated base and margin. Erythematous and papular eruption; ulcers in the throat; fauces and tonsils swollen, inflamed, and ulcerated; rupia with violent itching; necrosis; emaciation, with slow hectic fever; osteocopic pains and general hyperæmia.

Nitric Acid.—Constitutional syphilitic ulcerations, especially the inherited ulcerations of children, and when the Mercurial cachexia has been engrafted upon inherited syphilis. Chancre with raised edges, bleeds easily and profusely; pale, flabby, and prominent granulations; ulcers inclined to spread in circumference rather than in depth; fungous growths; discharge corrosive; buboes threaten to suppurate; coppery and violet-colored spots on the skin, squamæ, rupia, mucous tubercles, condylomata, drawing and pressing pains in the head. Also in primary chancre, with spongy, elevated margins, not painful, but bleeding readily and profusely. The remedy should be administered in both high and low dilutions, and not too hastily abandoned if one dilution has not answered.

In case of sloughy (eating) ulcers, *Nitric acid* should be used topically in a low caustic form, and thus will be found to act well with its constitutional administration.

Kali Hyd.—No remedy surpasses this as an antidote to the syphilitic poison in the secondary, and especially in the tertiary form of the disease. Nodes, Gummata, Erythema, tubercular skin eruptions, ulcers on tonsils, periostitis, and coryza are distinctly under its influence. After abuse of Mercury, hard bubo in a scrofulous system; ulceration of nose, mouth, or throat, with corrosive, burning discharge; lancinating pains in the throat; secondary and tertiary types of syphilis, threatening abscesses, system depressed. The pain of nodes is quickly relieved; and, when not very chronic, the nodes soon disappear. According to Ringer, large doses arrest the rapid sloughing of some syphilitic sores, and promote the healing process.

Mercurius Cor.—Chancres inflamed and painful; ulcers with a lardaceous floor, which secrete a thin, ichorous pus; acute inflammatory bubo, secondary symptoms make an early appearance; in iritis with affections of the conjunctivæ; soft, flat condylomata, mucous tubercles. Chancre, with ichor adhering to the bottom, and discharging thin pus, which stains the linen; combined chancre and gonorrhœa; buboes; skin affections, the symptoms being worse in bed, and at night.

Cinnabar.—Similar symptoms to the above occurring in scrofulous, indolent constitutions. Useful in secondary and tertiary forms; chancres with hard base in scrofulous persons; the middle of the chancre is raised and fungoid; indurated bubo; iritis, with pain in the supra-orbital region; circular ulcerations of the skin, mouth, and throat; ulceration of the tonsils in the secondary stage, when the vegetations and macous patches are the predominant lesions.

Merc. Prot.—Painless chancres; when the glandular system is largely implicated, inguinal glands large, swollen, but not disposed to suppurate; affections of the throat, indurated tonsils, secretions small in quantity but tenacious; orchitis following venereal taint.

Fluoric Acid.—Secondary syphilis of the throat and tongue, or osseous caries, pains in the bones generally; aching pains in the bones; dull and bruised pains in the breast and sacrum.

Cundurango.—Congestion of the Schneiderian membrane, extending to the frontal sinus; pimples, pustules, and blotches on the skin, especially the lips, giving rise to painful cracks in the corners of the mouth. It first came into notice by an accidental cure of constitutional syphilis.

Arsenicum.—Gangrenous sores, with florid, unhealthy granulations, which bleed on the slightest touch, and are painful and burning; or painless ulcers, secreting a watery, corrosive, and offensive fluid; rapid emaciation, prostrating diarrhœa; scaly skin, or malignant ulcerations in the secondary or tertiary stage; excessive sensitiveness; great restlessness; general rapid sinking of strength; dry, scaly, shriveled skin; blotches, eruptions, and ulcerations of the skin.

Arsenicum Iod.—According to Dr. H. Noah Martin, of Philadelphia, this remedy excels all others in the rapid cure of venereal bubo. It quickly reduces and disperses acute swellings of the inguinal and axillary glands, even after the peculiar throbbing pains have set in which seem to threaten suppuration.

Belladonna.—As an occasional remedy, *Belladonna* is very beneficial; especially in cases in which there is great pain, redness, and erysipelatous appearance.

Thuja.—Warty growths (Sabina if they are large, moist, and painful); small warts on the iris; mottled eruptions. Condylomatous excrescences on the penis, vulva; and about the anus; painful inguinal glands; purulent pimples; brown or red mottled spots, with itching; red nodosities; rupia.

Carbo Veg.—In cachexia syphilitica; extreme prostration; impairment of digestion, suppuration of bubo, parts livid and mottled, falling-off of the hair, furfuraceous desquamation; yellow skin, with impairment of digestion; ulcers having a gangrenous character, with nightly burning pains.

Carbo An.—Bubo assuming the phagedenic type.

Merc. Præcip.—When bubo puts on a phagedenic form and the various ulcerative processes become destructive, as in affection of the long bones; nodosities with severe pain at night.

Aurum.—Ulceration of the mouth and nose; ozaena, bone diseases, sarcocele. Particularly beneficial when the system has been broken down by the combined influence of syphilis and Mercury, and the mind, equally depressed, dwells upon suicidal thoughts. Mercurial cachexia; syphilis in the secondary and tertiary forms; ulcers of the nose and mouth, with fetid discharge; necrosis of the nasal bones; nodes of cranial bones; ulcers and crusts within the nose, with putrid smell; burning and boring pains in the bones.

Sarsaparilla. — Purulent vesicles, itching furiously; various skin affections.

Sulphur. — As an intercurrent remedy in all stages: In superficial ulcer, with a lardaceous base; when the disease threatens to assume a serious form, or is very obstinate; also of special value in sycosis.

Phosphorus. — Affections of the long bones, or the jaw bones; and when a dry cough, burning, stinging pain, bloody expectoration, and great debility, indicate danger to the lungs.

Mezereum. — Exostosis, necrosis, or caries, particularly of the shin bones, the part feels sore, and is aggravated by touch.

Clematis. — Orchitis, excrescences, scabies, tetters discharging bloody matter; pain and irritation, worse at night.

EPITOME OF SYMPTOMS.

Acid Nitric. For violent pains in the bones; ulceration of the mucous membranes; Mercurial symptoms, combined with bone-pains, congestions, ulcerations, and affections of the periosteum and bones; syphilitic pains in the head. Antidotes Mercurial impressions.

Acid Phos. — For periostitis.

Artemisia. — Mercurialization with bone-pains and rheumatism.

Asafœtida. — For caries and ozæna.

Aurum. — For syphilitic cachexia, scrofula, and ozæna.

Cinchona. — Excessive weakness, sweats, sensitiveness of the skin to changes of atmosphere; affections of the periosteum and bones; loss of strength and humors.

Creosote. — Scorbutic symptoms; mucous ulcerations; cutaneous ulcers; salivation.

Ferrum Phos. — Mercurialization combined with scrofula: indolent ulcers; periostitis.

Guaiaecum. — Mercurialization combined with rheumatism and gout.

Lachesis. — Mucous ulcers; gangrene from Hydrargyrosis.

Lycopodium. — Affections of bones; Night-pains.

Mezereum. — Ostitis and periostitis; impetigo and herpes.

Phosphorus. — Mercurialism; Ostitis and periostitis; paralysis.

Sarsaparilla. — Cutaneous eruptions, Mercurialism.

Silicea. — Ulcerations and caries; bone fistulas.

Staphysagria. — Ostitis and periostitis; hypochondria.

Sulphur. — Worst forms of Mercurialism; cutaneous eruptions and ulcers; iritis; affections of the bones, and Mercurial asthma.

Accessory Means. — All wear and tear of system, such as over-exertion of the mind in business or pleasure, must be avoided. Generous but plain diet, and avoidance of stimulants; comfortably warm clothing, rest, fresh air, and moderate daily out-of-door exercise, and other good hygienic surroundings are essential.

Generally, a warm bath about twice a week, at bedtime, is advantageous; also daily cold or tepid sponging, with abundant friction by means of a *bath-sheet*, on rising. The importance of thorough *cleanliness* in this disease may be inferred from the fact that some of the worst cases of primary disease have been successfully treated by prolonged warm baths. The septic discharge being removed as soon as formed, the sore heals much more rapidly than under ordinary circumstances. Cleanliness is not only valuable curatively, but, practiced thoroughly and immediately, is the best *prophylactic*. Abstinence from tobacco and all stimulants should be insisted on.

In those patients who for a long series of years have been addicted to the daily use of stimulants, it is recommended that they be not entirely and suddenly deprived of them, but that they be used twice a day, in diminished doses, with their meals rather than upon an empty stomach. High livers, on the other hand, should be restricted in the quality and quantity of food, and be brought as soon as possible to a plain, unstimulating, but nutritious regimen. The influence of the mind upon the body is nowhere more clearly witnessed than in syphilitic patients. It is advised, therefore, that the surgeon be frank and candid in regard to the curability of the disease; not buoying him up with hope of a speedy recovery, which is sure to be followed by disappointment and chagrin, nor yet delivering a gloomy prognosis, dooming him to utter and inconsolable despair. There is no disease that produces such a profound impression upon the system, even to the complete wrecking of all functional and organic action, as *syphilophobia*. To prevent this, the surgeon should be frank at the outset, and assure the patient, that, though the cure may be protracted, and though it may even be subject to modified relapses, yet the treatment, if persisted in, will ultimately restore him to health and constitutional vigor.

As a rule, simple lint soaked in tepid or cold *Calendula* water, and renewed every three or four hours, is the only application required for the local sore. But for primary sores and ulcerated glands (*buboes*), a solution of twenty grains of *Chloral Hydrate* to one drachm of water is exceedingly beneficial. The healing process is regulated and hastened, and auto-inoculation prevented, by its use. *Powdered Chlorate of Potash* is another valuable local remedy, especially for removing fetor and hastening healing. The powder should be sprinkled over the open sores, and covered

with a wet compress. As topical applications in sloughy ulcers, *Carbolic acid* and *Nitric acid* have been already recommended.

CHAPTER V.

Constitutional Syphilis.

WHEN the poison of syphilis has infected the system, it produces certain symptoms which develop at variable periods, from two weeks to six months or more, after the primary disease. The skin and mucous membranes first become affected, afterward the bones and internal organs. The result is rarely fatal, unless the brain or other vital organ is affected. When once involving the system, it is difficult to entirely eradicate it; and, in the earlier periods, it may be communicated by means of the saliva, the milk, or even the discharges from secondary sores; later in the disease the poison seems more localized, and is less prone to be eliminated from the blood.

The more frequent forms of syphilis, as they are presented to the practitioner, are treated of in this and the accompanying chapters; but almost every organ of the body falls under the baneful influence of the disease. All its varied manifestations are treated in accordance with the principles already laid down. The special indications for remedial agents to cure it are given on pages 390 to 393 and 400 and 401, to which reference should be made in the treatment of all its diverse pains and disturbances, whether of function or organism.

Syphilides.—The syphilitic eruptions on the skin correspond quite closely to the ordinary cutaneous diseases. They are all characterized by a *dull, copper-colored areola*; are grouped together, and possess a circular shape; *do not itch*, and leave behind a *brownish stain or discoloration*, which remains some time after their complete cure.

Mr. Keys gives ten varieties of eruptions, named in accordance with the prominent lesion which characterizes them; viz.:

1. The erythematous syphilide (roseola).
2. Pustular syphilide.
3. Papular syphilide.

4. Vesicular syphilide.
5. Pigmentary syphilide.
6. Squamous syphilide.
7. Tubercular syphilide.

These various forms of the syphilides, owing their origin to the same poisonous contamination, are to be treated very much in the same manner; so also will the *mucous tubercles*, which occur near the orifices of the mucous canals, especially where the parts are bathed in perspiration, and where irritation is kept up by more or less movement. They form small, soft, flattened tumors, which secrete a thin, offensive discharge.

Syphilitic Ulcerations.—The mucous membrane of the pharynx is subject to a peculiar foul, excavated ulcer, with ragged edges, and covered with a grayish-yellow slough. The inside of the mouth, lips, tongue, and even the larynx, are liable to be affected by syphilitic ulcerations. Small gummy tumors appear upon the legs, then soften, break, and form deep ulcers, characterized by their circular form, their clean-cut edges, irregular base, and unhealthy discharge. They occur generally about the knee-joint.

Syphilitic Ulceration of the Larynx.—This is caused by an extension of the ulceration of the palate. It is characterized by tenderness, great huskiness of voice, suffocating cough, and expectoration of sticky, tenacious mucus or bloody matter. There is slight difficulty in swallowing at times, the voice degenerates into a mere whisper, and it is accompanied with great loss of flesh, etc. Strength is impaired, and life often terminated by it.

Treatment.—The medicines which have produced most marked benefits, are the *Kali bichrom.*, *Kali jod.*, and *Merc. cor.* Professor Helmuth has derived much benefit from *Ars.*, *Iod.*, *Macrot.*, and *Podoph.* A weak solution of *Iodine* thrown into the throat by means of an atomizer is recommended as highly efficacious. Professor Helmuth uses a solution of ten drops of the first decimal dilution of *Iodine* in a gill of water, applied twice a week.

Syphilis of the Mucous Membranes.—The following manifestations of syphilis usually occur late in the disease, but may take place during all its stages. They appear in the mouth, throat, and nose. 1st. Erythematous patches, with erosions and superficial ulcers. 2d. Mucous patches, which appear late. 3d.

Scaly patches. 4th. Gummatous ulcers, which also come on late in the disease.

Syphilitic Ostitis, Periostitis, and Osteocopic Pains.—The bones and also their coverings may be involved in constitutional syphilis; also the ligaments and joints, attended by pain and fever, with nocturnal exacerbations. The bones most frequently affected are the tibia, clavicle, ulna, and bones of the skull. It may begin either in the periosteum, or in the bone itself as a slow inflammation. The affected part is exquisitely tender, with great pain, *aggravated at night*. Gummy deposits take place in the capsule of the joints, in a diffused form, producing thickening, weakness of the joints, and finally loss of motion. Osteocopic pains occur in constitutional syphilis, and are of a boring, splitting, bone-breaking character, coming on at night with great regularity and terrible earnestness, and disappearing in the early morning. They are supposed to be due to a febrile exacerbation, coming on toward evening, which dilates the peripheral blood-vessels, producing periosteal irritation and congestion; the warmth of the bed seems to increase their severity, and they become so intense that the sufferer is not able to bear the weight of the bedclothes. Thermometrical observations in a few cases that I have examined, show an increase of two or three degrees in temperature; these examinations were made in patients suffering greatly from these osteocopic pains, and when the whole system showed a considerable hyperæmia. They are most frequent about the upper extremities, the head, and the chest, and oftentimes are felt in the continuity of the long bones of the lower limbs. They are occasionally felt at the insertion of the tendons into the extremities of the long bones.

Syphilitic Cephalalgia.—The *severe cephalalgias* that accompany syphilis, and come on regularly at night, are a disease of like character, and are cured by the same remedy, viz., *Mercurius*, to be given in accordance with the principles already laid down.

Syphilitic Nodes.—These result from an inflammatory periostitis, generally terminating in the new formation of bone. The sub-periosteal tissues become congested; and soft, round, and spindle cells are formed, which proliferate and increase till they separate the periosteum from the bone, giving rise, by degrees, to an oval lump or tumor (node), which shades off into the surrounding tissues, and which may remain for years. This tumor, or node,

at first feels doughy, but afterward becomes distinctly fluctuating. After remaining soft for a considerable time, it becomes firmer, and either disappears under treatment by absorption, or disintegrates, leaving behind an ulcer, the floor of which is bone, denuded of its periosteum. The bone becomes dark-colored from exposure, and after a time separates and comes away, after which the ulcer heals. The bones most involved are the superficial flat bones.

The course of a node is usually slow, its primitive softness yields to firmness and solidity, till it feels like a hard, oval tumor, freely movable under the skin, and exquisitely painful, especially at night. Under treatment, it loses its solidity, and finally disappears by absorption, leaving little or no trace of its existence. At times they put on a feeling of softness centrally; the overlying skin becomes dark red, and adherent to the mass, and soon yields to the inflammatory process, producing an ulcer, the floor of which is bone, and which is exceedingly difficult to cure.

If it affects the skull, the outer table becomes necrosed, and requires removal. I removed a piece of the outer table of the skull over four inches square, with a considerable portion of the diploë, successfully, in a patient who was at the time an inmate of the Good Samaritan Hospital, St. Louis, Mo. It may also produce meningitis and death; or it may involve the brain, by destroying the inner table of the skull, the brain protruding through the opening made, with the serious results that usually follow this condition.

There is a form of bony outgrowth that is frequently developed in the epiphysal ends of long bones, of an irregular-shaped projection, or of a prominent pedunculated form, that resembles the outgrowths often seen in rheumatic gout.

The treatment of nodes is simple, and they are generally very responsive to medication. The Mercurial preparations, if not counter-indicated by other conditions, are usually competent to effect their cure. It must be understood, in this connection, that, whatever remedy is found capable of curing this disease, that remedy should be continued, at lengthened intervals, for months, after all evidences of the trouble have passed away. The older the node, as a rule, the longer treatment will be required. (Consult syphilitic remedies, pp. 390-393.)

Alopecia.—Alopecia frequently occurs as one of the conditions of the syphilitic contagion. The roots of the hair are prin-

cipally involved; large quantities of scales or scurfs form about them, and destroy the capillary radices; the hair, as a consequence, falls out, leaving, in some instances, the scalp perfectly bare. The eyebrows are also affected in the same way, and the hair of the breast and limbs sometimes becomes involved. Tertiary syphilitic lesions, so called, whether the effect of Mercury or contagion, are seldom seen at present, and, I believe, are more frequently the result of poisonous doses of the drug than the sequelæ of the syphilitic virus. A careful investigation will show that the ravages of syphilis, as described in the works of Allopathic syphilographers, two or three decades ago, as compared with those of the present day, hold an inverse ratio to the poisonous quantities of Mercury given in its treatment. (For treatment, see "Special Indications," pp. 390-393.)

Onychia Syphilitica.—This consists of inflammation of the matrix of the nail, and consequent loss or disfigurement of the nail itself, and is an occasional attendant upon both secondary and tertiary syphilis. Its further consideration will be referred to the treatment of constitutional syphilis.

Syphilitic Iritis.—The primary seat of the disease is in the iris; but other tissues of the eye may be implicated. Generally, but one eye is involved, which presents most of the symptoms of common iritis. At the beginning of the disease, says Helmuth, the iris becomes duller, with a grayish appearance, the radii being more or less effaced; the small circle of this membrane is livid or copper-colored; its tissue tumefies, and forms an elevated ring composed of thick, downy flakes. The pupil is more or less contracted, and assumes an irregular shape; the cornea is somewhat dimmed, and on its inner surface may be seen small fasciculi of congested vessels; the tunica albuginea is of a rose color, which, at its juncture with the cornea, is converted into a dark-red hue, called the *dyscrasia circle*. As the disease advances, the iris becomes more discolored, its surface is covered with exudation, its free margin is tumefied, and upon its anterior surface there are elevations of a grayish or yellow tinge. The pupil at length becomes perfectly immovable; pedunculated excrescences, called *condylomata of the iris*, spring from the membrane, and adhesion takes place between the iris and the lenticular capsule. At the bottom of the anterior chamber, pus mixed with blood can be seen. There are at this time violent constrictive, boring pains

in the supra-orbital region of the affected side, which radiate toward the head; they are *increased toward evening, most violent at midnight, and abate toward morning*, the peculiar characteristics of syphilitic pains. Sight is more or less affected, by reason of the plastic exudations formed in the pupillary opening. Photophobia is rarely present in this disease.

Treatment.—The object of the surgeon, in the treatment of this formidable disease, is to allay inflammatory action, eliminate the syphilitic poison, and to arrest further extension of the inflammatory process. To accomplish this, the pupil must be artificially dilated; this can be accomplished by dropping into the eye, three or four times a day, a few drops of a solution of *Atropine*.* This dilates the pupil, and rests the inflamed muscular fibers.

Rhus tox. is useful in the primary stage, accompanied with profuse lachrymation.

Petroleum should be given when there is heat in the eyes, with pain, heat, and throbbing in the occiput.

Cinnabar, when pain affects the supra-orbital region; when abscess forms in the iris, *Hepar.*, *Merc. sol.*, and *Sulph.*

When *chancrous ulceration* attacks the corona, *Ars.* and *Calc.* are remedies of value.

Treatment.—The treatment of all constitutional contaminations by syphilis should be conducted with a view to the complete eradication, if possible, of the primary source of the mischief. The remedies are those mentioned in the following paragraphs, and on pages 390-393. The same general directions already given as to diet, hygiene, etc., must be thoroughly followed.

Constitutional Remedies.—For the constitutional effects of syphilis, the following will be found to answer almost every conceivable condition: *Ars.*, *Bell.*, *Berb. aq.*, *Cinnab.*, *Carbo an.*, *China*, *Corydal.*, *Hepar*, *Hecla la.*, *Hydrast.*, *Kali bicrom.*, *Jod.*, *Merc. cor.*, *jod.*, *et. sol.*, *Mez.*, *Nit. ac.*, *Phos. ac.*, *Phytol.*, *Sepia*, *Sulph.*, *Syphilin*, *Thuja*.

For the syphilodermata: *Ars.*, *Ars. jod.*, *Aur.*, *Nit. ac.*, *Graph.*, *Hepar*, *Kali bichrom.*, *Creos.*, *Phytol.*, *Merc. jod. et cor.*, *Rumex*, *Lach.*, *Lyc.*, *Syphilin*, *Tart. emet.*

For syphilitic periostitis, nodes, and osteitis: *Asa.*, *Ars.*, *Aur.*, *Ac. fluor.*, *Calc. jod.*, *Hecla la.*, *Kali jod.*, *Merc. cor.*, *jod.*, *et sol.*, *Mez.*, *Nit. ac.*, *Sil.*, *Staph.*, *Still.*, *Syphilin*.

* Atropine, grs. iv.; distilled water, 1 oz.

For syphilitic iritis: *Ars. jod.*, *Atrop.*, *Bell.*, *Cinnab.*, *Colch.*, *Kali jod.*, *Merc. cor.*, *jod.*, *et sol.*, *Nitric ac.*, *Spig.*, *Syphilin.*

For syphilitic laryngitis: *Ars. jod.*, *Hepar*, *Kali jod. et bichrom.*, *Syphilin.*

For gummatous lesions: *Ars. jod.*, *Iod.*, *Calc. jod.*, *Merc. jod.*, *Syphilin*, *Sil.*

Mercurial toxæmia is benefited by *Nit. ac.*, *Hepar*, *Mez.*, *Dulc.*, *Kali chlor.* When there is an exudation of lymph, or the inflammation is of a sub-acute character, *Apis* and *Colch.* will be found reliable.

Local Treatment.—The local treatment should be simple, and non-irritating to the external manifestations. *Hydrast.* and *Merc. sol.*, *Calend.*, *Carbol. acid.*, and *Soda biborate* lotions, have, in my hands, done effective service.

For gangrenous ulcerations: *Ars.*, *Lach.*, *Ac. carbol.* (See "Special Indications," pp. 390-393.)

CHAPTER VI.

Infantile Syphilis.

If either of the parents are syphilitic, the infant may inherit the disease. If the father is contaminated, he may transmit the disease to the fœtus directly, at the time of conception, and the mother may be infected through her offspring; or he may communicate it to the mother, and she may infect the child; or, if the mother alone is syphilitic, the fœtus may become affected during intra-uterine life, through the blood of the mother. Under such circumstances, the fœtus is apt to die about the fourth month, which ends in miscarriage. Repeated miscarriages, without some overt act, at once suggest syphilitic contamination. Under more favorable auspices, the child may be either born alive, thin, and shriveled, with a prematurely old expression, a hoarse voice, a snuffling breathing, nasal discharge, and perhaps covered with a scaly eruption; or it may be born apparently healthy, and the syphilitic symptoms develop a month or two afterward.

Treatment.—The infant should be removed from the breast, and be brought up by hand, that it may not imbibe further poison from its mother, or infect a hired nurse. This having been done, either of the following remedies may be employed, in accordance with their pathogenesis, and the characters of the case: *Fer. jod.*, *Calc. carb.* and *jod.*, *Hepar*, *Kali jod.*, *Merc. jod.*, *Mez.*, *Lach.*, *Nit. ac.*, *Phytol.*, *Sang.*, and *Thuja*. The utmost attention should be given to those general hygienic and dietetic principles that are so imperatively demanded in all cases of blood poison and otherwise depraved systems.

CHAPTER VII.

Spermatorrhœa.

SPERMATORRHŒA, or seminal flux, is chiefly met with in young men, usually from the ages of eighteen to thirty years, and is commonly the consequence of that terrible vice, which, practiced in solitude, emasculates the body, enfeebles the mind, and degrades the moral status of the mind to a condition of absolute loathing and disgust of self. The generative organs seem to be impressed with a dual mixture of irritability and debility; the testes are excited into action by the simplest causes; a look, a thought, the gentle motion of a carriage, or the effort at stool, will produce a feeble ejaculatory effort, a few drops passing the urethra. From two to four emissions during the week, or oftener in the more advanced stages, mark the debility of the organs, and the irritability that invests them. In a short time, the physical and mental powers suffer; the face is pallid, sallow, and anæmic; there are ringing in the ears, dyspepsia, and emaciation; the features are drawn; expression is listless; eyes lifeless; spirits depressed to the very verge of despondency and despair. Coitus is impracticable, as the gush of semen takes place either before erection occurs or without its occurrence, the most melancholy forebodings ensue, and the patient is dragged down to the very depths of degradation and moral discomfort.

Causes.—Self-abuse; morbid conditions of the urethra; irritability of the bladder; constipation; rectal irritation; ascarides;

hæmorrhoids; prolapsus ani; elongation of the prepuce; frequent excitations of the passions without natural gratification; sexual excesses; excitation of the sexual organs from novel reading, etc.

Treatment.—The curative treatment consists in the use of those agents, which, while they diminish irritability, invigorate and strengthen the genito-urinary organs. Happily for humanity, Homœopathy offers a rich Materia Medica for the various conditions and varieties of this truly pitiable disorder, among the most valued of which are the following: *Anac.*, *Aur.*, *Agnus cast.*, *Bell.*, *China*, *Camph.*, *Bufo*, *Brom.*, *Calc.*, *Canth.*, *Eryng. aquat.*, *Cobalt*, *Gels.*, *Dig.*, *Ferr. brom.*, *Phos.*, *Phos. ac.*, *Plat.*, *Puls.*, *Iris vers.*, *Nux. com.*, *Kali brom.*, *Nuphar lutea*, *Selen.*, *Staph.*, *Sepia*, *Ustilago*, *Zinc ox.*, *Sulph.* (See "Special Indications," at the end of this chapter.)

Local Measures are the cold salt-water sitz bath, every night and morning, or the cold shower bath; light bed-covering, and a hard mattress; light suppers, entire absence from all highly seasoned food, wines, liquors, tobacco, etc.; properly directed exercise, ventilation, a well-regulated diet, Electricity, the pleasant occupation of the mind, the avoidance of stimulants and of all enervating habits, and, above all, the cheering effects of pleasant society, pursuits, and amusements. A suspensory should be worn constantly; and a knotted towel, the knot to the spine, should be tied around the body, so that the patient will be awakened by the pressure whenever he lies over upon his back. The wet girdle at nights, the spermatic ring, and Electricity are valuable expedients.*

Impotence.—Impotence is often met with in persons ordinarily healthy, and in some cases where great muscular power exists, and arises from either a natural deficiency in individual organization, or from exhaustion of the nervous power by habitual mental or physical exertion, by excessive sexual indulgence, over-exercise, or study, carried to an intemperate degree.

Asperma.—This is very rare, except in cases of atrophy, absence of the testes, or organic degeneration of their structure.

* "Roech's Emission Preventer," manufactured by Gross & Delbridge, Chicago, has proved of great value in the hands of many physicians. It is a bandage that keeps the penis in a position in which an erection, as well as any discharge, is impossible.

It has been observed that each individual possesses a certain given amount of procreative power, which, being early exhausted or habitually wasted by frequent intercourse, can be restored partially only by such attenuated remedies as have a decided penchant for these organs. Among the remedies are: *Agnus. cast.*, *Anacard.*, *Berb.*, *Bufo*, *Calad.*, *Con.*, *Gels.*, *Phos. ac.*, *Papaya*, *Selen.*, *Staph.*, *Ustilago*. Other general and local means, as already recommended, should be employed during the progress of the treatment.

Marriage.—This important question, so frequently referred to the practitioner as to its curative value, is hereby presented for future guidance:

1st. If spermatorrhœa exist in the *spinal* or *cerebral* form, marriage is injurious.

2d. If the disease exists in its general form mainly, and the act can be consummated without injurious consequences to the patient, although imperfectly, marriage may be advised.

3d. As a rule, marriage should not be recommended as a curative remedy.

SPECIAL INDICATIONS FOR SPERMATORRHŒA.

Ferrum Met.—Impotence from abuse of sexual organs in weak people; great debility following the discharge, and nocturnal emissions.

Stillingia and Nux Vom.—Caused by masturbation, or abuse of alcoholic liquors, coffee, sedentary habits, and mental exertion.

Plumbum.—With a relaxed penis, after drinking wine, with lassitude next morning; violent, painful erections from the least excitation.

Gelsemium.—From relaxation, weakness, and irritability of the seminal vesicles.

Belladonna.—From weakness of the seminal vesicles, with sweating of the sexual organs, and pressing and lacerating pains in the parts; indifference to voluptuous excitement; sexual desire extinguished; sadness, with increased sexual desire.

Selenium.—Itching and coldness of the genitals; nocturnal emissions, with amorous dreams; the semen escapes with every stool, and after urinating; dribbles away unperceived during sleep; is very thin, and odorless; he is hopelessly distressed.

Ustilago Madis.—With erotic, amorous dreams.

Ferrum Brom.—Great debility, anæmia, and depression of spirits.

Cantharides.—With great impotence, and inability to retain the urine.

Nuphar Lut.—With painless morning diarrhœa.

Sepla.—*Mental symptoms*; after coitus, anxious and restless all day; discouraged and easily frightened in the evening; vertigo.

Antimonium Crudum. — After lascivious fancies, less sexual desire.

Phosphorus. — Cerebral excitement, with flushed face and glistening eyes; satyriasis.

Stramonium. — Depression of spirits, with spermatorrhœa; great delirium; sexual excitement during the night; during mental derangement; sexual irritation.

Dioscorea Vill. — Depression of spirits; great weakness of the knees after pollution, without erection, sensation, or dreams.

Natrum Carb. — Dissatisfied and vexatious; out of humor after painful emission.

Natrum Mur. — During lascivious thoughts, without erection, profuse discharge of prostatic fluid.

Lycopodium. — Exciting imagination even causes no erection, although there is sexual inclination.

Digitalis. — Frequent lascivious fancies, day and night.

Hamamelis Virg. — Gloomy and depressed mood after emissions, with amorous dreams.

Ustilago Madis. — Great despondency, and irritability of the mind, with great despondency; great prostration, and great pain in the lumbar region the day after an emission, with sexual dreams; erotic ideas, fancies, and amorous, with seminal emissions, and spermatorrhœa.

Thuja Occid. — Heaviness and ill humor after emissions.

Selenium. — Hopelessly distressed, semen escapes with every stool, and after urinating.

Conium Mac. — Hypochondriasis from denial of sexual intercourse; among single men; sad, anxious, low spirited; suppression of sexual desire.

Staphysagria. — Indifference, low spirits, and dullness of mind, after onanism.

Ignatia. — Lascivious and amorous fancies, with exalted sexual desire; weakness of the parts, and impotence, and sexual fancies and dreams.

Mercurius Vivus. — Excitement, with painful nocturnal erections, with tension seemingly caused by flatulence. Impotence from abuse of the sexual organs.

Ambra Gris. — Imaginations, without irritation of the sexual organs.

Silicea. — Thoughts with sexual desire very much excited day and night, with frequent erections, and drawn-up testicles; ill-humor and irritability after coitus.

Caladium Seg. — Lewd thoughts without erections.

Calcarea Carb. — Nervous relaxation; discontent, and irascibility, with trembling and great weakness in the legs, principally in the knees; ill humor and dissatisfaction.

Graphites. — Thoughts run on sexual subjects, tormenting him so that he fears insanity.

PART IV.

Dietary Table for the Sick.

It is the almost general practice to give a patient, in nearly every kind of illness, nourishing food, and that which is easy of digestion, to strengthen rather than to injure the nutritive forces of the system.

To the invalid, there are three important events of the day; these are the three meals: and how carefully and delicately they should be prepared, not only with reference to their adaptability to the conditions of the patient, but that they may be agreeable to the taste, and pleasing to the eye.

Whatever shall be the food to be served, let it be prepared in a dainty and inviting manner. Place it upon the cleanest of napkins, and serve it upon the choicest of ware and the brightest of silver. Let not the quantity prepared be too great or infinitesimally small, but just sufficient to stimulate the appetite to a keen relish, rather than obtund it by its magnitude. Never leave an article of diet in the sick-room; for it is the best of means of destroying an appetite, which should be encouraged, and not weakened.

The most common articles of diet are tea and toast; yet there very few persons who know how to prepare them properly. "There is about one person in ten thousand," says a distinguished gastronomical artist, "who really does know how to make toast; who actually appreciates the difference between a thin, symmetrical, well-yellowed, crisp piece of toast, with the crust cut off, and just from the fire, and a thick, unshapely slice, unevenly crisped on the outside, and of doughy softness in the center." One is digestible: the other is not only indigestible, but absolutely injurious to the patient's stomach.

It is so, to a large extent, with almost every article of food prepared for the sick-chamber; and it should be the duty of the mother, the wife, or the daughter, to see that the diet of the

invalid is prepared and administered with the utmost nicety and cleanliness.

There are three kinds of food that belong to the list of dietetics: the *nitrogenized*, the *non-nitrogenous*, and *inorganic* foods. The first consists of all articles of food that have for their bases certain principles called albumen, caseine, and fibrine. These exist largely in all meats of animal origin,—eggs, milk, cheese, etc. These elements are taken into the system, and are more readily converted into living tissue, their chief function being as *tissue-builders*. Beef, mutton, veal, venison, chicken, pork, fish, oysters, eggs, milk, and cheese belong to this class.

The non-nitrogenous foods are required to keep up and maintain the heat of the body. These are the *fat-producers*, and cannot be taken by those whose digestive organs are weak. Hence they are unfit food for fever patients, and those who suffer with derangements of the stomach. Among the non-nitrogenized foods are, the *animal fats*, oils, cream, butter, cocoa, and olive oil, the *starches*,—corn-starch, arrow-root, sago, wheat flour, potatoes, rice,—and the gums. The *inorganic* foods are those which, of themselves, cannot support life, yet are very necessary to the maintenance of the system, and are classified as belonging to the variety of alimentary substances. While some are solid tissue-factors (as lime, which builds up bone-structure), their purpose is chiefly to assist in the processes of nutrition. Among this class are water, salt, iron, and phosphate of lime.

Recipes.

I. — Tea.

This is one of the most frequently used and the most palatable dishes for the sick-room, if properly made and served. Put two teaspoonfuls of tea leaves into a small tea-pot; pour two teacupfuls of *boiling* water over it, cover it closely, and let it steam for a few moments.

This beverage should be made at the side of the patient's bed, and a few minutes only before it is required. Let the tea be the freshest and best that can be procured, green, black, or mixed, as the physician may direct. It is very nice to have a small, pretty tea-pot, a tea-cup and saucer of china, delicately constructed, and all pertaining thereto of the cleanest and daintiest appearance.

II. — Beef Tea.

Cut a pound of perfectly lean beef into small pieces, put them into a wide-mouthed bottle, cork it tightly, and place it in a pot of *cold* water, in which there is a saucer at the bottom. Heat it gradually; then let it boil slowly for two or three hours, when all the juice will be extracted from the meat.

Now pour off the juice, season it with salt, carefully, as it requires a very little. When it is cold, skim off the fat globules, and serve for use.

III. — Beef Essence.

Cut three-quarters of a pound of lean steak (the sirloin or round answers best), and soak in a pint of cold rain-water for half an hour, squeezing the meat occasionally; then put it on the fire, cover it, and boil it slowly for ten minutes, removing the scum. Season with salt, and serve hot. Nice accompaniments are, Albert biscuit, wafer biscuit, or the small oyster crackers. The addition of a little rice to the soup when preparing makes a pleasant change.

IV. — Beef Juice.

Select a thick cut of fine, fresh, juicy steak, without fat, or have the fat carefully taken off. Broil it over the coals for only a minute, or long enough to merely heat it throughout. Put it over a warm bowl set in a basin of hot water; cut it in many places, and squeeze out all the juice with the aid of the meat-squeezer. Salt it slightly, and serve immediately, freed from every particle of fat, with a cracker or two.

V. — Chicken Broth.

Cut up a fowl, and crack the bones. Put it into three pints of cold water; boil slowly, closely covered, for three or four hours, or until the meat falls in pieces. Strain it; then add two tablespoonfuls of rice which has been soaked for half an hour in a very little warm water, with also a chopped sprig of parsley. Simmer it for twenty minutes longer, or until the rice is thoroughly cooked. Season with salt and pepper, and serve with crackers, which should be broken into the broth just before eating.

VI. — Chicken Custard.

Take half a pint of chicken broth, beaten yolks of three eggs, and a little salt. Mix well, and cook it in the custard kettle (as for boiled custard), until it has thickened. Serve in custard cups.

VII. — Chicken Panada.

Roast a small chicken, and take out the breasts, or use more of the meat, if preferred, and add a little salt; chop it as fine as possible, pound it, and pass it through a colander. Soak half the amount of the crumb of French rolls, or good bread (not too fresh), in tepid milk; squeeze it nearly dry, and mix it with the chicken. Thin it with a little strong chicken broth (which may be made with the remainder of the chicken), or with boiling water. Serve it in a custard cup, to be eaten with a spoon. For convalescents, a very little finely minced parsley may be added.

VIII. — Mold of Chicken Jelly.

Cut half of a raw chicken into small pieces, and break the bones; put it on the fire with a quart of cold water. Boil it slowly, until it is reduced to less than half; season with salt and a little pepper, if pepper is permitted to be given. Strain it first through a colander; then a jelly-bag, into a mold or a bowl. If the chicken is quite tender, broil carefully the breast of the other half; cut it into dice forms, or put it whole into the mold or bowl, and cover it with the liquid. When the jelly has hardened, scrape off the top layer of fat, then turn the jelly on a little oval platter.

IX. — Chicken, and Ceylon Moss.

Cut a small fowl into small pieces, and put over the fire with three pints of cold water, four ounces of Ceylon moss (which can be purchased at the drug store), and half a teaspoonful of salt. Boil all together an hour; then strain it through a jelly-strainer or napkin, into little cups or molds.

X. — Mutton Broth.

Take a pound of fresh mutton, free from fat; cut it into thin slices with a sharp knife; put it into a suitable dish; salt it to taste; pour over it a quart of *cold* water, and let it simmer over

a slow fire for an hour; then let it *boil* for an hour longer. Strain off the broth through a sieve, excluding the meat fiber.

XI. — Veal and Sago Broth. (After Marian Harland.)

Take two pounds of a knuckle of veal, cracked to pieces; two quarts of cold water; three tablespoonfuls of best pearl sago, soaked in a cupful of cold water; one cupful of cream, heated to boiling; and the yolks of two eggs beaten light. Boil the veal and water in a covered sauce-pan very slowly, till reduced to one quart of the liquid; strain, season with salt, and stir in the soaked sago, having previously warmed it by setting for half an hour in a sauce-pan of boiling water, and stirring from time to time. Simmer half an hour, taking care it does not burn; beat in the cream and eggs, and give one full boil up, and turn out to serve.

XII. — Beef and Tapioca Broth.

Take one pound of beef, soak, and cut into pieces, and put into a quart of cold water for half an hour; then boil it slowly, keeping it closely covered for two hours. Strain it. The last half-hour add a cupful of tapioca (having soaked it first half an hour in a little water), a small sprig of parsley, and a thin slice from an onion. When done, remove the parsley and onion; season with a very little pepper and salt, and two or three drops of lemon juice. When ready to serve, put into the soup an egg, carefully poached in salted water, the white being merely set; then dish up for use.

XIII. — How to Prepare an Uncooked Egg.

Beat the yolk well in a goblet with a teaspoonful of white sugar; then stir in one or two teaspoonfuls of brandy, sherry, or Port wine. Add to this mixture the white of an egg beaten to a stiff froth, and stir all well together till the goblet is filled. If wine is not desired, flavor the egg with a trace of nutmeg if not contra-indicated. It is quite palatable without any flavoring at all.

XIV. — Tapioca Jelly.

Take one cupful of tapioca, four cupfuls of water, the juice of one lemon, and a little of the grated rind, and sweeten to taste.

Soak the tapioca for four or five hours in the water; sweeten it, and set it in a pan of boiling water to cook an hour, or until it is thoroughly done and quite clear, stirring it frequently. When nearly done, stir in the lemon; and when done, pour into molds. Serve with sweetened cream, and flavor to taste.

XV. — Sea-Moss Blanc-Mange.

Wash the moss well, and soak for an hour in a little cold water. To half an ounce of the moss, allow one quart of water; or rather of rich milk, if milk is not prohibited. When the water or milk is boiling, add the soaked sea-moss,* and sweeten to taste. Let them simmer till the moss is entirely dissolved. Strain the juice into cups or little molds. A little bit of cinnamon in stick, or a little wine, may be boiled with it; but the simple flavor of the sea-moss is quite pleasant. Serve with a little cream, and sugar sprinkled over it.

XVI. — Arrow-Root Jelly.

To two heaping teaspoonfuls of the best arrow-root, rubbed smooth with a little cold water, add a coffee-cupful of *boiling* water or rich milk, which has been sweetened with two teaspoonfuls of sugar. Stir and boil it until it has thickened. It may be flavored with lemon-juice, if made with water; or with brandy or wine, if made with milk. It is very nice without flavoring. Pour into a cup or little mold, and serve with cream and sugar poured over, or with a compote of fruit around it.

XVII. — Corn-Starch Pudding.

To one pint of rich milk, add two tablespoonfuls of corn-starch, a scant half-cupful of sugar, the whites of three or four eggs, a little salt, and flavoring to suit. Beat the eggs to a stiff froth, dissolve the corn-starch in a little of the milk, stir the sugar into the remainder of the milk, and place on the fire. When it begins to boil, add the dissolved corn-starch; stir constantly for a few moments, when it will become a smooth paste; now stir in the beaten whites of the eggs, and let it remain a little longer to cook the eggs. Flavor with vanilla, and put into a mold.

XVIII. — Cocoa-Nut Pudding.

After the preceding pudding is just finished, add half a cocoa-nut grated, and put into a mold. Serve with whipped cream around it; or a sauce of boiled custard, made with the yolks of the eggs.

XIX. — Boiled Custard.

Beat the yolks of three eggs very lightly, and stir into them two tablespoonfuls of corn-starch dissolved in a little milk, and one tea-cupful of sugar. Then bring two quarts of milk to a boil, and take it off the fire; pour it into the eggs, a little at first; return it to the fire, and stir until it thickens, not allowing it to boil; let it remain long enough to well cook the starch. Now stir in lightly the whites of four eggs beaten to a stiff froth, permitting the custard to remain half a minute on the fire to set the eggs. Flavor with vanilla or chocolate. To make this savory dish for a single person, a very much smaller quantity of ingredients should be used.

XX. — Rice Jelly.

Take water enough to make a thin paste with two heaping teaspoonfuls of rice flour; then add to it a coffee-cupful of boiling water. Sweeten to taste, and boil till it is transparent. Flavor by boiling with it a piece of cinnamon stick, or add several drops of lemon-juice, if intended for a fever patient.

XXI. — Milk Porridge.

Put a dozen raisins into two cupfuls of milk, and bring it to a boil; then add a *heaping* teaspoonful of flour, rubbed to a paste with a little cold water or milk, and boil for three or four minutes. The raisins need not be eaten; but they improve the flavor of the milk.

XXII. — Milk Toast.

Toast two or three thin slices of bread with the crust cut off, having them of equal size. When still hot, spread evenly over them a very little fresh butter, and sprinkle over some salt. Now pour over a small tea-cupful of boiling milk, thickened with half a teaspoonful of flour, and salted to taste. If the

patient cannot take milk, moisten the toast with boiling water. Serve while hot. It is a very appetizing dish when fresh made, and hot.

XXIII. — Panada.

Take two large Graham crackers, Boston, soda, or hard pilot biscuit, sprinkle a little salt or sugar between them; put them into a bowl, and pour over them just enough boiling water to soak them well; put the bowl into a vessel of boiling water, until the crackers are quite clear and like a jelly, but not broken. Then place them, without breaking, into a hot saucer; add more sugar or salt, if desired; a few spoonfuls of sweet, thick cream poured over them, make it exceedingly palatable. Make just enough for one meal.

Toasted bread, cut into thin, even slices, may be served in the same way.

XXIV. — Grated Bread Panada.

This may be made by adding an ounce of grated bread or rolled crackers to half a pint of boiling water, slightly salted, and allowing it to boil three or four minutes. It may be sweetened, and flavored with wine or nutmeg, or both; or the sugar and nutmeg may be simply sprinkled over.

XXV. — Wine Whey.

Put a pint of fresh milk into a sauce-pan, and let it come to a boil; as soon as it reaches this point, add slowly half a wine-glassful of sherry wine, skimming off the curd which rises for about fifteen minutes; add a tablespoonful more of wine, skim what curd remains, and it is ready for use. Sweeten to taste, and season with nutmeg if permissible.

XXIV. — Codfish.

Cut *thin* pieces of codfish, crosswise of the fibers; soak over night to extract the salt; pour off the water the next morning in which it has soaked, put the fish into some fresh water, and cook it for half an hour; then add a teacupful of milk and a tablespoonful of flour; just before serving, beat up an egg and stir it in.

This is a nutritious dish, and easy of digestion. Eaten with a dyspepsia cracker or two, it makes a nice meal.

XXVI.—Dyspepsia Crackers.

Take of *wheat meal* one pint; butter, half a tablespoonful; and water enough to make a stiff dough. Beat this dough thoroughly with a potato-masher or a rolling-pin for half an hour, laying it on a bread-board for the purpose; roll it into a ball, and beat it over and over again. Next, roll it out *very thin*, cut into round or square forms, prick with a fork, and bake in a quick oven.

XXVII.—Brown Flour Crackers.

Take *good brown flour*, and prepare it in the same way as recommended above, and you have an excellent dish for such invalids as have weakened digestive organs.

XXVIII.—Bonny-Clabber.

This is simply sour milk, or loppered milk, as it is termed, and should be used before the whey separates from the curd, or it will become acid and tough. Set it on ice for an hour before using. Cut out carefully with a large spoon, put in saucers, and eat with cream and nutmeg. This is one of the most wholesome of dishes, and exceedingly palatable.

XXIX.—Unleavened Wafers.

Mix good, dry flour, with a little salt in it, to a stiff dough with milk. Roll out *thin*, and cut into round cakes, which should be rolled out again almost as thin as letter paper. They may be mixed with water if desired. *Bake very quickly*. These wafers are of easy digestion, very delicate, and fill an important place in the dietary of the dyspeptic. Eat with soups, broths, or in any other way.

XXX.—Kumys.

This is a form of milk largely employed in cases of consumption, and is known as the Arabian milk-wine. The Arabs make it of mare's milk, but cow's milk is an excellent substitute. As it contains some alcohol, it is contra-indicated in certain cases.

Take three quarts fresh, rich milk, add three quarts hot water, half a pound of white sugar, one teacupful of good yeast. Dis-

solve the sugar in the hot water, add this to the milk, and let it cool till it is lukewarm; now carefully and slowly stir in the yeast. Set the crock and contents in a warm place, *stirring it occasionally*. In five or six hours it will be slightly sparkling, and small bubbles will rise to the surface when stirred. When it reaches this stage, put into *stout* bottles in a cool place, in the refrigerator, or on the floor of a cool cellar. A thick mass will form on the surface (the caseine). When it begins to separate, and once or twice a day, for several days, the bottle should be well shaken, and this will fall to the bottom in the shape of a powder. When two days old, it is ready for use, though it will keep for quite a time; it is in its best condition from the second to the seventh day inclusive. Use it with a champagne tap.

In starting a new lot, instead of yeast, use a bottle of the old Kumys, stirring it into the milk and water carefully. If too much alcohol is generated, use *less sugar*. Use stout bottles. To make a good article, requires considerable experience in making it.

XXXI. — Egg-Nogg.

Take one egg, one tumbler of milk, one dessert-spoonful of best brandy, and same quantity of sugar. First scald the milk, and let it get cold. Beat the sugar and egg up together to a froth, put into a tumbler, add the brandy, and fill up with milk. If in a hurry, the milk may be used without scalding. This is a pleasant drink, and is both stimulating and nutritious.

XXXII. — Eggs on Toast.

Salt the water well, and, when it comes to a *simmer*, drop lightly into it an egg from a saucer, in which it has been broken. Whiten the top of the egg, by throwing the water carefully over the egg with a spoon. Cook rare; and take the egg out with a perforated ladle; trim off the ragged edges, and slip it on a small, thin piece of hot buttered toast, neatly cut into squares; sprinkle a little pepper or salt over it, and serve hot.

XXXIII. — Broiled Beefsteak.

Cut out the tenderloin of a porter-house steak, having it about three-quarters of an inch thick; trim and press it into an oval shape. Broil it carefully over a hot charcoal fire, or hot hickory

coals, cooking it rare, so that the inside looks *pink*, not raw. During the cooking, turn it over two or three times; be careful not to burn it. After it is cooked, pepper and salt to taste. Then place a *small piece* of fresh butter on the top, set it into an oven a minute or two, to allow the butter to melt, and soak into the meat. Serve it hot, and eat with a cracker.

A mutton-chop may be cooked in the same way,—after first scraping the bone, and wrapping a piece of white paper around it, scalloped at the extreme end, and trimming it into good shape.

Invalid's Bill of Fare.

The following bill of fare may be varied from time to time, as the patient is convalescing or otherwise. Let the invalid have his meals regularly, keeping as closely as possible to his previous habits of living, if they are right and proper.

Breakfast.

Oatmeal, cracked wheat, or corn porridge; a poached egg on toast; hominy grits; a mutton-chop, or broiled bird, with tomato sauce.

Dinner.

Beefsteak or mutton-chop, with mashed or baked potatoes; chicken or mutton broth, with rice; a broiled bird on toast; dry bread or crackers; wafers or toast; toasted Graham crackers.

Dessert: Sea-moss blanc-mange, or a raw egg with sherry wine.

Tea.

Boston brown bread cut in slices, with cream poured over; milk toast, dry toast, or toasted crackers; a baked apple, or fruit in season in sparing quantities.

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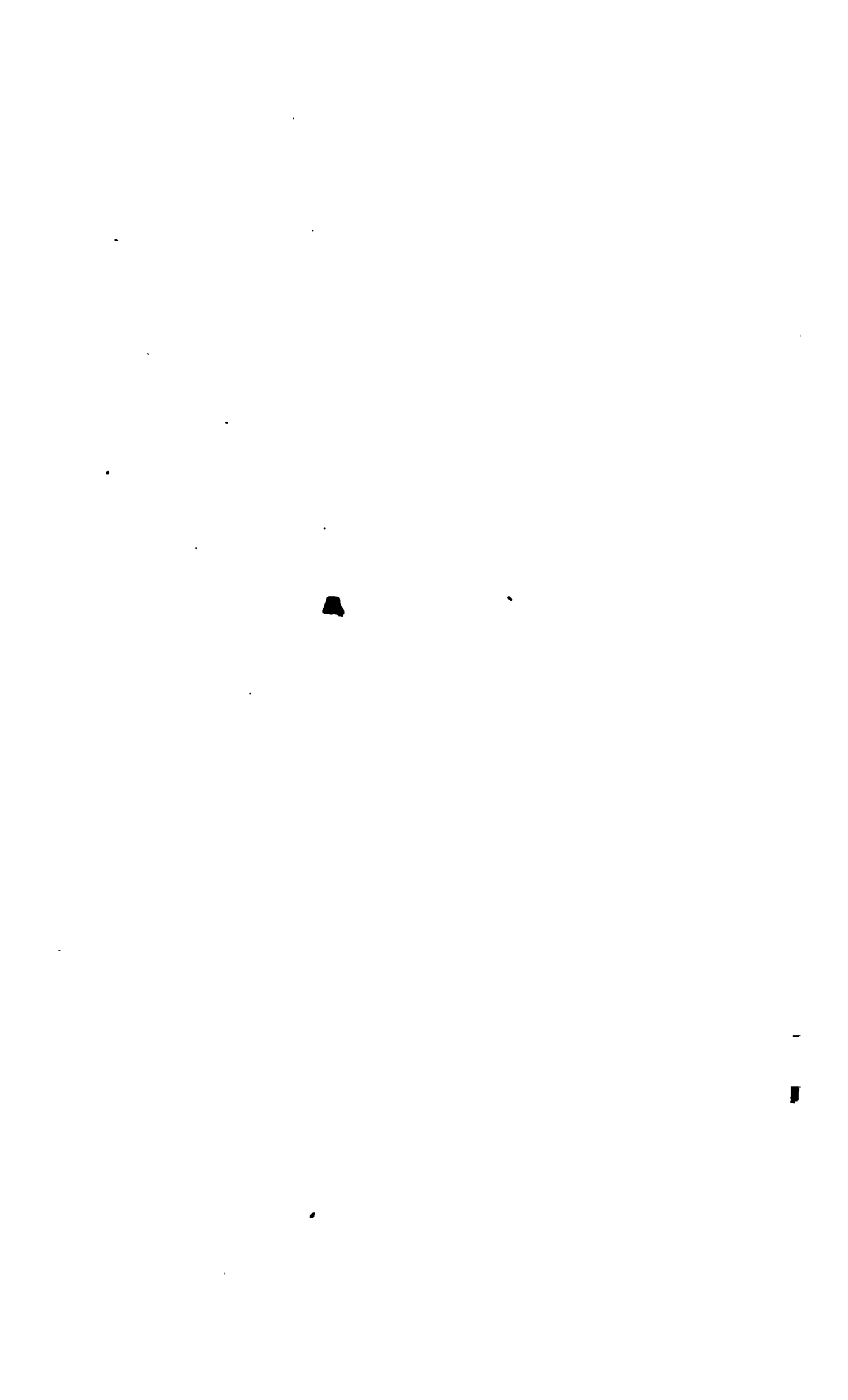
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